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DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR EXPLORATORY OIL AND GAS WELLS NEAR BADGER CREEK AND HALL CREEK

Lewis and Clark National Forest
Glacier and Pondera Counties, Montana

September 1989

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ABSTRACT

This Draft Environmental Impact Statement (DEIS) discloses the environmental effects of proposed oil and gas exploration drilling in the North End Geographic Unit of the Lewis and Clark National Forest, Rocky Mountain Ranger District. This area is commonly known as the Badger-Two Medicine Area. The Blackfeet people often refer to this area as the "ceded strip" and "Blackfeet unit".

This DEIS analyzes the impacts of proposed drilling applications submitted by Chevron USA, near Badger Creek, and Fina Oil and Chemical Company, near Hall Creek. Based on the issues and concerns identified during the scoping process, the DEIS focuses on impacts to water resources, air quality, Glacier National Park resources, adjacent Bob Marshall and Great Bear Wildernesses, the Badger-Two Medicine Roadless area, wildlife and fisheries (including the grizzly bear), vegetation, outdoor recreation and visual resources, archeological resources, Blackfeet Tribe reserved rights and traditional religious practices, local economic and social conditions, including public health and safety associated with the drilling proposals.

The analysis addresses 33 combinations of alternatives, including roaded access, helicopter mobilization of the drilling projects, and no action. The EIS also addresses each of the exploration proposals independently. The EIS preferred alternative is to permit the exploration projects, utilizing roaded access and mitigation requirements that minimize adverse environmental effects.

Comments on this draft must be received by the Responsible Official of the lead agency at the above address by December 15, 1989.

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CHAPTER I. PURPOSE AND NEED FOR ACTION

The Bureau of Land Management (BLM) and the Forest Service have received two Applications for Permit to Drill in the RM-1 Geographic Unit. This unit is within the Rocky Mountain Ranger District of the Lewis and Clark National Forest, in an area commonly known as the Badger-Two Medicine (Map 1.1). Prior to issuing a decision on these proposals the BLM and Forest Service must comply with the requirements of the National Environmental Policy Act (NEPA). NEPA requires Federal agencies to use a systematic, interdisciplinary approach to ensure the integrated use of natural and social sciences in planning and decision-making. NEPA also directs that an environmental analysis of proposed Federal actions must be completed to determine the effects of the actions on the environment and reasonable alternatives to the proposed actions.

The Mineral Leasing Act of 1920 authorizes leasing of public lands for private extraction of oil, gas and other minerals. In 1981, the Forest Service established an oil and gas leasing program as required by the Energy Security Act of 1980. Forest Service lands leased for oil and gas have been processed under the direction and guidelines in the Environmental Assessment on Oil and Gas Leasing on Nonwilderness Land (Forest Service, 1981). The direction and guidelines in the Environmental Assessment on Oil and Gas Leasing on Nonwilderness Land have been brought forward, tiered to, and expanded upon in the Lewis and Clark National Forest Plan (Forest Service, 1986a, pp. 2-56 to 2-58) and accompanying Lewis and Clark National Forest Plan Environmental Impact Statement (Forest Service, 1986d).

In reviewing the status of the Chevron and Fina proposals, the agencies have determined that an Environmental Impact Statement (EIS) is appropriate for documentation of the analysis. This comprehensive EIS discloses the effects of the proposed exploratory drilling and other reasonably foreseeable oil and gas actions, including cumulative effects of possible future oil and gas exploration and production.

A. DECISIONS TO BE MADE

Chevron's Proposal

Chevron USA of Denver, Colorado has submitted an Application for Permit to Drill (APD) an exploratory well on its Federal Lease M-25173, located northeast of Goat Mountain in Section 35, Township 29 North, Range 12 West in Pondera County, Montana (Map 1.2). The portions of the APD that are available for public review are included in Appendix B of this document. There are portions of the application which include information on Chevron's drilling program and geologic information that are confidential and not available for public review.

Lease M-25173 was issued October 1, 1981, with a lease term of 10 years. The lease is scheduled to expire on September 30, 1991, if oil and/or gas is not found in commercial quantities on or before that date. The terms of expiration for this lease have been suspended by the BLM pending completion of the Environmental Impact Statement. If approved, it is Chevron's intent to begin work on their proposed project during the first field season following the agencies' decision. Chevron anticipates the drilling activity, as proposed, will encompass a period of 13 months. The proposed project entails drilling an exploratory well to evaluate the oil and/or gas potential on Chevron's lease acreage. If hydrocarbons are encountered, their production potential would be evaluated.

Fina's Proposal

Fina Oil and Chemical Company (Fina) filed an APD to drill an exploratory well on Federal Lease M-53323 in the Hall Creek vicinity of the Badger-Two Medicine area in October of 1983. Fina's proposed well site is located in Section 26, Township 30 North, Range 13 West in Glacier County, Montana (Map 1.2). The portions of the APD that are available for public review are included in Appendix B of this document. There are portions of the application which include information on Fina's drilling program and geologic information that are confidential and not available for public review.

Lease M-53323 was issued June 1, 1982, with a lease term of 10 years. The lease is scheduled to terminate on May 31, 1992, if oil and/or gas is not found in commercial quantities on or before that date. Because of the time required to complete the environmental analysis and previous appeals, the BLM has suspended the terms of expiration for this lease.

The proposed project entails drilling an exploratory well to evaluate the oil and/or gas potential on Fina's lease acreage. Fina expects their project, as proposed, to take about 8 months. If hydrocarbons are encountered, the production potential would be evaluated.

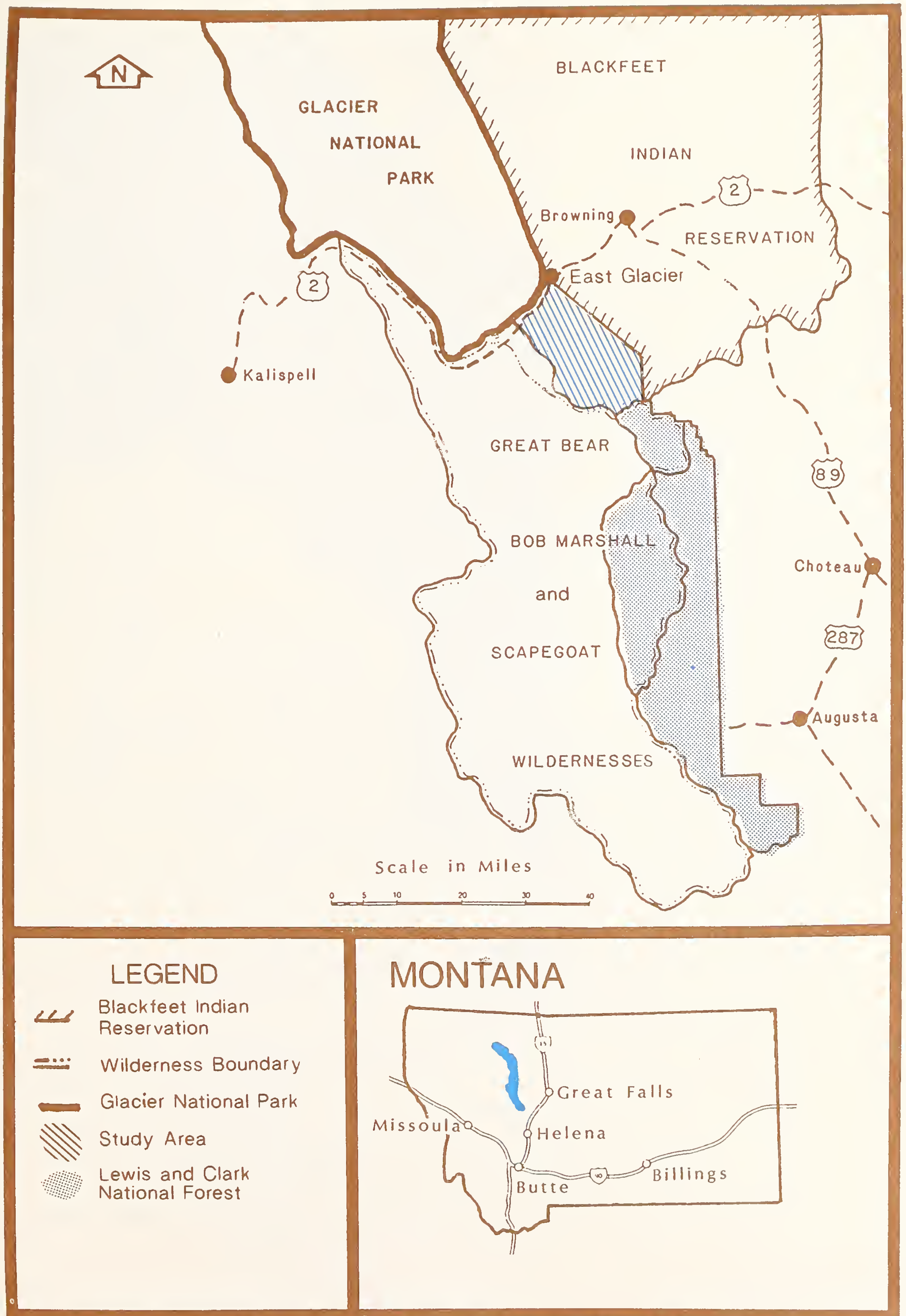
An Environmental Assessment (EA) for Fina's proposal was completed by the Forest Service and the Bureau of Land Management. A Decision Notice permitting the company to drill was issued on January 31, 1985 (Forest Service and BLM, 1985). (Note: Fina's proposal in this early EA is referred to as the Hall Creek APD). Nine appeals on the Hall Creek EA were received by the Interior Board of Land Appeals. In August 1985, the Interior Board of Land Appeals remanded the case to the BLM to resolve four issues. Following resolution of these issues, a second Decision Notice was issued by the BLM on April 13, 1987. Eleven appeals were filed with the Interior Board of Land Appeals on this decision, and subsequently a stay of action was granted. At the request of the Forest Service, the Fina decision was returned to the agencies for further analysis.

The Forest Service and BLM have decided to combine the analysis of Chevron's and Fina's proposals into one comprehensive EIS because of concerns that surfaced from the appeals of the Fina EA, and a recognized need to more fully evaluate the potential cumulative effects of two similar actions in the same geographic area.

Forest Service Authorizations

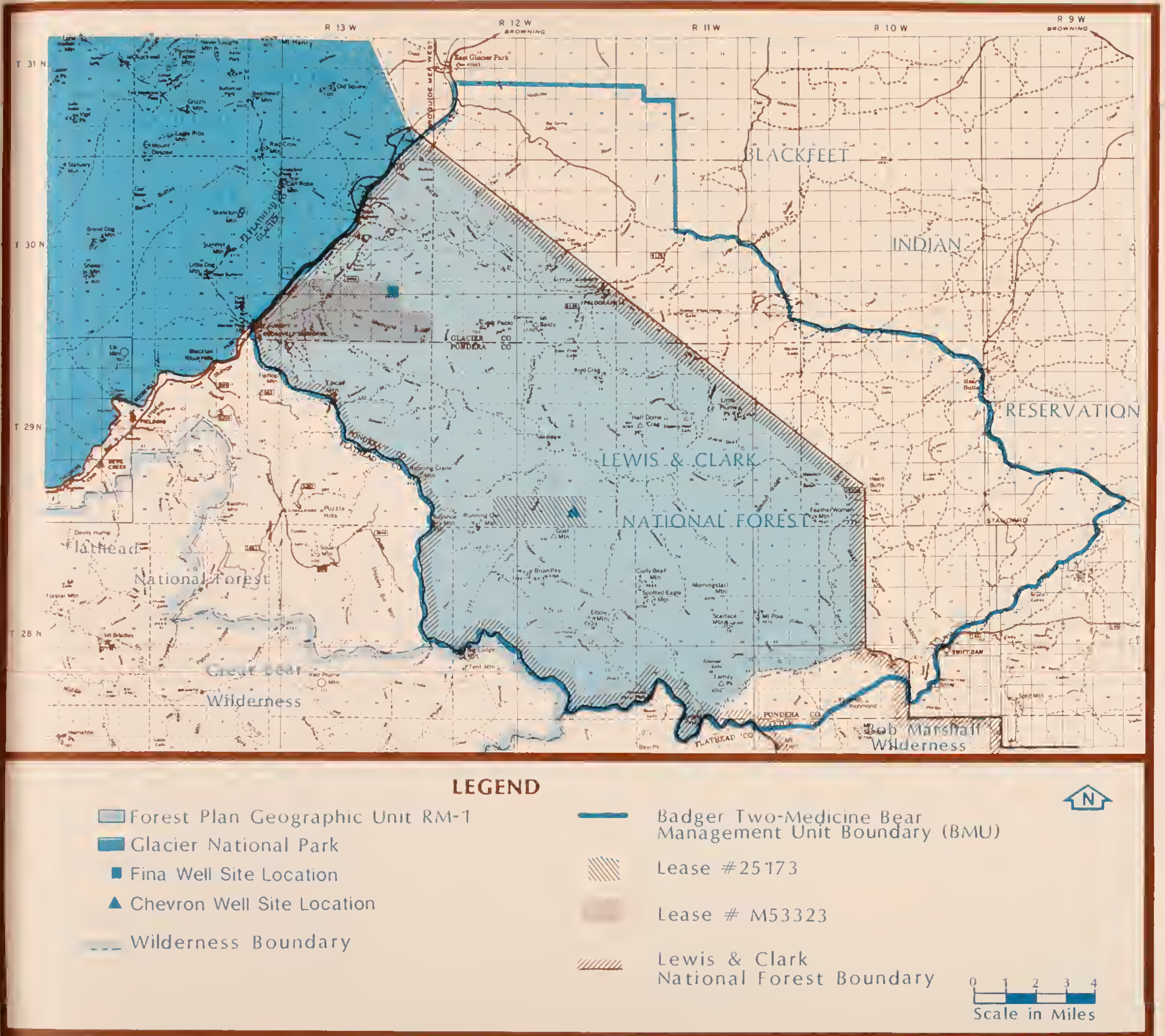
Under the provisions of the Federal Onshore Oil and Gas Leasing Reform Act of 1987, the Forest Service has the approval authority on the surface use plan of operations of an APD. For activities proposed on federal lease tracts on National Forest lands, the Forest Service has the authority and obligation to ensure that these activities are conducted in a manner that minimizes conflicts with other uses and damage to surface resources, and assures rehabilitation of disturbed areas after activities are completed. The Forest Service must review the surface use plan of operations and make recommendations for the protection of surface resources. If the surface use plan of operations is approved, the decision is sent to the BLM who has the approval authority for the drilling program.

For oil and gas-related activities off the lease tract, the Forest Service authorizes special use permits. For example, a Forest Road Special-Use Permit would be used to authorize the construction and use of any road located on or substituting for a route planned as a Forest Development Road, as shown in the Lewis and Clark National Forest Plan (Forest Service, 1986a). A Private Road Special-Use Permit authorizes road construction and use for access to mineral lease areas. Commercial services or facilities (for example, flowlines, tank batteries, pumping stations) needed for the production of oil and gas from federal leases on National Forest lands and which are not identified as a lease right also require Forest Service special use permits.

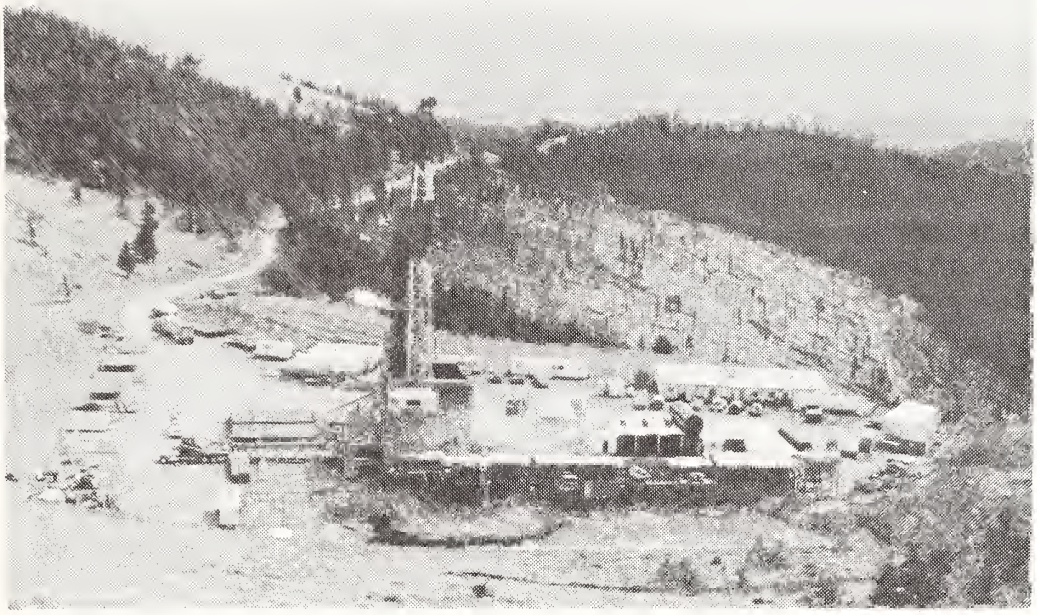


MAP 1.1

REGIONAL LOCATION MAP



MAP 1.2 VICINITY MAP



Typical wildcat well located in rugged terrain, using roaded access.

Typical wildcat well located in rugged terrain using helicopter access. (photo courtesy of Columbia Helicopters)

Bureau of Land Management Authorizations

The BLM must review the technical drilling portions of the APDs following receipt of an approval decision of the surface use plan from the Forest Service. The drilling program includes engineering and technical aspects of the APD. These technical aspects are the casing and drilling program, the hydrogen sulfide plan, and pipeline and production requirements, and are as follows:

> Casing and drilling program - To ensure casing program will protect fresh water zones (refer to Application for Permit to Drill, Appendix B). To ensure proposed cementing of casing is adequate to cement the casing back to the surface or back to last casing setting point or will cover any usable or producible formations and protect formations from contaminating one another. Casing grades and weights must be adequate to withstand pressures they may encounter and must be rated to work in the environments they will be exposed to. The mud program must comply with the regulations and must be adequate to control pressures encountered while drilling. The blowout prevention equipment, choke and kill lines and training of rig personnel must meet standards in Onshore Order 2. The drilling program will be reviewed to ensure the above, plus other areas addressed in Onshore Orders 1 and 2.
>
> The Hydrogen Sulfide plan will be reviewed to ensure that it complies with the Draft Onshore Order on H_2S (refer to Hydrogen Sulfide Contingency Plan, Appendix B). The plan includes training of rig personnel, protection of the public, casing and mud systems designed to handle H_2S, and control of emergency operations in an H_2S occurrence.
>
> The pipeline and production plans will be reviewed to ensure they comply with Onshore Orders 4 and 5, measurement of production, and that they would safely handle the production of the wells.

An approved APD or operating plan on an issued lease tract gives the lessee exclusive rights and privileges to drill for oil and gas deposits on those lands, together with the right to conduct attendant on-lease activities such as road construction and use, and pad construction. Should production be established from a permitted well, further environmental review may be necessary prior to production of the well to ensure compliance with NEPA regulations as well as considerations for threatened and endangered species under the Endangered Species Act.

State and Local Government Permits

Chevron and Fina are responsible for acquiring all necessary State and local government permits and authorizations as required, should the proposal(s) be approved.

B. MANAGEMENT REQUIREMENTS

Management direction for Federal agencies that applies to oil and gas activities is found in several documents and regulations. Included below are both Forest Service and BLM requirements. Guidelines on application procedures and requirements are found in Onshore Oil and Gas Order No. 1 (43 CFR 3164.1). Lease stipulations and direction in the Lewis and Clark National Forest Plan (Forest Service, 1986a) apply directly to the conduct of exploratory drilling on National Forest lands.

U.S. Department of the Interior Direction (BLM)

Various BLM standards and procedures are automatically applied to drilling operations on all Federal lands. Three of these automatic coverages are described as follows:

Onshore Oil and Gas Order No. 2

This order establishes specific and detailed requirements along with minimum standards covering well control during drilling, casing and cementing, drilling mud and circulating system, drill stem testing, special drilling operations, related surface use and the abandonment of drilling operations. This order addresses minimum levels of performance expected from lessees and operators when conducting drilling operations on Federal or Indian lands. The order also details the enforcement actions to be taken if drilling operations are not conducted in compliance with these standards.

Draft Hydrogen Sulfide Order

This order requires contingency plans in the event of an escape of poisonous hydrogen sulfide gas. This order requires the submittal of a plan detailing the operator's readiness for this type of event and precautions for preventing such an event. The plan details special training, safety equipment placement and use, and operating procedures that would be involved in drilling a well. Chevron and Fina have submitted Hydrogen Sulfide Contingency Plans for their drilling proposals (Appendix B).

Notice to Lessees Number 3A

This notice deals with procedures related to undesirable events such as spills or discharges. It requires that the BLM be notified should such an event occur during drilling or production. BLM engineering technicians and environmental scientists working in conjunction with Forest Service specialists would inspect and monitor the situation, should an event occur, to assure that the proper corrective measures are taken.

Forest Service Direction

The Lewis and Clark Forest Plan (Forest Service, 1986a) contains management standards for oil and gas exploration and development. The Plan also provides other Forest-wide standards for the protection and coordination of other resources, and contains specific management direction for 18 different management areas on the Forest. These standards and direction are tiered to from the Lewis and Clark National Forest Plan EIS (Forest Service, 1986d). Both the Forest Plan and Forest Plan EIS are incorporated into this document by reference. Appendix C contains excerpts of Forest-wide management standards for oil and gas activity, and management direction specific to the RM-1 Geographic Unit. Forest Service management direction provides for existing lease rights on lands that have been identified for leasing for oil and gas.

The Environmental Assessment for Oil and Gas Leasing on Nonwilderness Lands (Forest Service, 1981) established the policy and overall direction for issuance of oil and gas leases on nonwilderness lands on the Lewis and Clark National Forest prior to the Forest Plan. Direction in this Environmental Assessment provided for occupancy leasing of National Forest System lands which are accessible and where surface resources can be protected through the use of standard and specific stipulations. Lease terms and stipulations are the actual contractual agreements with the lessee. Federal leases M25173 and M53323 include terms and stipulations designed to protect surface resources, existing improvements, and govern the lessee's conduct and activities. Lease terms and stipulations for these leases are displayed in Appendix A. Leases and stipulations as they apply to the entire RM-1 Unit are discussed in detail in Appendix L.

The Environmental Assessment for Oil and Gas Leasing on Nonwilderness Lands also established a review process for specific project proposals and monitoring requirements, and management requirements for project activity such as that proposed by Chevron and Fina. Such requirements will be incorporated into the operating plans for Chevron and Fina, should drilling be approved.

C. ISSUES

Public comments were solicited and analyzed during three distinct phases in the projects' analyses: 1) during development of the Hall Creek EA for the Fina APD (BLM and Forest Service, 1985); 2) during the original Chevron EIS analysis; and 3) more recently during the scoping effort for the Chevron/Fina combined EIS.

Fina Issues

Fina issues were originally defined through the scoping conducted in the Hall Creek EA (BLM and Forest Service, 1985). An Interdisciplinary (ID) Team identified issues following a review of the Fina proposal and verification of the accuracy and adequacy of the preliminary list of issues identified during public scoping activities. Scoping activities included a combination of open house meetings, news media releases, individual correspondence, and presentations to local organizations. Comments were recorded and used to finalize issues to be addressed in the EA. This background report is included in Appendix D of this document. The reader is referred to the 1985 Hall Creek EA (Forest Service and BLM, 1985) for more detailed information on the scoping process used in the Hall Creek analysis.

Chevron Issues

The EIS Interdisciplinary (ID) Team identified issues, concerns and opportunities through a scoping process that included: sending a scoping package to several hundred people that described the proposal and identified agency responsibilities, and; requesting their help in identification of issues to be examined in the analysis. Open houses and workshops were also held to present Chevron's proposal and to solicit issues from the attendants. Each comment was recorded and used in an analysis of both issues and concerns.

The ID Team reviewed all comments in order to: 1) identify the major issues and concerns to consider in the analysis; 2) determine if a comment would be a part of an identified issue; and 3) prepare a response if the comment was either not considered part of an issue, beyond the scope of the analysis, or could be answered with the current available information. The Chevron EIS scoping document (August 1986) is included as Appendix D of this document.

Chevron/Fina Issues

In February 1988 a scoping package was mailed to approximately 350 people to notify them of the decision to combine the Chevron and Fina analyses into a single comprehensive EIS. In addition, this package requested their assistance in refining or identifying the issues to be addressed in the combined environmental analysis. No completely new issues were identified during this scoping period. Only eight comments were received. Most of the comments were a reiteration or expansion of the issues previously identified in either the Hall Creek EA or the original Chevron EIS scoping (August 1986). The Chevron/Fina EIS scoping document (April 1988) is included in Appendix D of this document.

A review by the ID Team of all the scoping material available, the previous Fina decision appeals, and Lewis and Clark National Forest Plan appeals, was the basis for final issue identification. No new issues were identified in the 1988 scoping responses. Consequently, the ID Team adopted the 1986 issue list that was determined from the Chevron scoping, with appropriate modification and elaboration. The issues addressed in this EIS are enumerated below and will be used along with other appropriate information, in selecting a preferred alternative:

> ***1) In addition to exploration drilling, where and what type of hydrocarbon production systems and facilities are appropriate for the project area?*** This issue raises the question of what effects will occur

on access, seasonal activities and safety during exploratory drilling and production, including potential development levels, activity corridors, facilities and equipment, for each alternative.

2) What will be the effects on surface and groundwater quality? The expressed concerns include effects on surface and ground water from construction activities, drilling fluids, and production facilities. Water use and water rights issues are also raised.

3) What will be the effects on air quality within and adjacent to the project area? The expressed concerns are for the effects on air quality from road dust, engine emissions and slash burning, and for the potential effects of hydrogen sulfide and other released gases. The concerns include inquiries into air quality effects within and adjacent to the project area during exploration drilling phases, and in the event of future activities.

4) How will access be managed to accommodate other resources and uses? The wide variety of concerns expressed include trail and road management under the Forest Plan and Travel Plan, road use and limitations during drilling, and post drilling access opportunities and effects. Post drilling reclamation strategies were identified as a major concern for both exploration and production activities.

5) What will be the effects on Glacier National Park and adjacent wilderness? This issue raises the concern for the effects of both proposed exploration and possible subsequent activity on Park and wilderness-related values, including air quality, noise, vegetation, wildlife, and visual values.

6) How will the project affect the wilderness characteristics of roadless lands in the Badger-Two Medicine area? This issue questions effects on the roadless character of the Badger-Two Medicine from both proposed exploratory drilling and possible future oil and gas activity.

> It should be noted that the purpose of this issue analysis is only to disclose the effects of drilling activities on wilderness-related values in response to comments we received. The area is not presently designated wilderness and is being managed under the Forest Plan for a variety of uses, including oil and gas leasing.

7) What will be the effects on wildlife, including threatened and endangered species? This issue questions the effects of the proposed projects on the following wildlife species and their habitats: grizzly bear, wolf, bald eagle, peregrine falcon, elk, moose, bighorn sheep, mountain goat, deer, black bear, furbearers, and nongame species. Also discussed are the Interagency Rocky Mountain Front Wildlife Guidelines and their role in the analysis.

8) What will be the effect on fisheries? Concerns include the effects on fisheries from road construction and crossings, diversion structures, and increased fishing pressures. There are also concerns regarding the effects of contaminants such as petroleum and hydrogen sulfide gas.

9) How would vegetation be affected? Concerns raised are for the damage to existing vegetation (including sensitive, threatened and endangered species) from possible introduction of chemicals, herbicides and noxious weeds. Also questioned are the effects on current grazing patterns.

10) What will be the effects on visual quality and dispersed and developed recreation? The visual quality concerns question potential changes in visual condition from existing travelways and from Glacier National Park. The recreation issue encompasses effects on recreation opportunities, activities, and resources.

11) How will the proposal affect cultural values? Concerns were raised about the effects that exploration and possible production may have on traditional Blackfeet culture, religious practices, and archaeological resources. Compliance with the American Indian Religious Freedom Act is also an issue.

12) How will the project affect rights reserved by the Blackfeet Nation under the 1896 Agreement? Concerns expressed include potential effects on Blackfeet hunting and fishing rights, Blackfeet timber rights, and Blackfeet rights to access the RM-1 Unit. Road closure restrictions and road reclamation concerns were also expressed.

> The RM-1 Geographic Unit is within the area that was once part of the Blackfeet Indian Reservation. The Agreement of 1896 between the Blackfeet Indian Nation and the United States reserved certain use rights on these lands for members of the Blackfeet Indian Nation. The Lewis and Clark National Forest Plan contains management standards for any decision with respect to these lands (Forest Service, 1986a). The RM-1 Unit is commonly referred to as the Blackfeet Unit by the Blackfeet Indian Nation.

13) What will be the social and economic benefits and costs associated with this project? Economic concerns expressed include employment, population changes, earnings, housing, and public finance. Questions about the social effects on local communities and interest groups were also raised.

14) Will the project affect health and safety for humans and wildlife in the immediate area and nearby communities? Health and safety concerns expressed by the public include emergency plans for blowouts, health risks from hydrogen sulfide and other released gases, road use safety, and potential problems from accidental release of toxic chemicals.

15) Other concerns. In addition to the public issues and concerns listed above, the agencies have identified other concerns for this analysis. These include the effects on the Elk Calf Mountain National Recreation Trail, the effects on the proposed Continental Divide National Scenic Trail, the environmental considerations of lease issuance and consistency with the Forest Plan, and the effect of Chevron's proposal on potential classification of North Badger Creek under the Wild and Scenic River Act.

Mule Deer.

D. ANALYSIS PROCEDURES

Scope of the Analysis

This document describes site specific environmental effects of actions proposed by Fina Oil and Chemical Company and Chevron USA in their APDs. The analysis of effects described herein tiers to the Lewis and Clark National Forest Plan (Forest Service, 1986). The analysis and conclusions documented herein are based on requirements contained in the Forest Plan. The reader is referred to the Lewis and Clark Forest Plan for more specific management direction prescribed for the RM-1 Unit. Excerpts of certain Forest Plan requirements are included as Appendix C.

This EIS documents the cumulative effects of other on-going and reasonably foreseeable activities that may occur in the study area, including resource activities planned or scheduled in the Forest Plan. The apparent relationships of these activities and events to the Chevron and Fina proposals are discussed in Table 4.23. The EIS also discusses reasonably foreseeable oil and gas activities relating to the Chevron and Fina projects. Neither Chevron nor Fina has proposed any production activities, although both companies have provided information regarding hypothetical facilities and estimated production needs in order to aid the ID Team in its analysis.

Because of the extent of the area that could be affected, particularly by access alternatives and other proposed oil and gas activities, the study area includes all lands within the RM-1 Geographic Unit as defined in the Lewis and Clark Forest Plan (Forest Service, 1986a). The analysis also considers the effect on outlying areas, including local communities and adjacent lands, such as the Blackfeet Indian Reservation and Glacier National Park.

The grizzly bear cumulative effects analysis encompasses the area identified as the Badger-Two Medicine Bear Management Unit (Map 1.2). Bear Management Units (BMUs) were formerly referred to as Bear Evaluation Units in the Lewis and Clark National Forest Plan. The Badger-Two Medicine Bear Management Unit is also used as a land base for analysis of several other wildlife species and vegetation because of its physiographic character.

The size of the study area is partly in response to public comments that indicate that oil and gas activity decisions in the RM-1 Unit should be made in the broader perspective, considering the possibilities of accelerated exploration activity and eventual field development. Because of the important grizzly bear and roadless resources in the RM-1 Unit, this EIS includes an analysis of the effects of the proposed exploration activities as well as other foreseeable activities, including possible production activities that may be permitted in the area, and are discussed in detail in Appendix L. The lack of geologic data regarding oil and gas reservoir locations and uncertainty as to the lessee's future activities make such an analysis speculative in nature. However, reasonable projections are made to show the scope of some of the more likely possibilities and to display the effects of these potential actions.

There is no existing data about proven, or even inferred oil and gas reserves in the RM-1 Unit. Additionally, there is no existing information about the extent or existence of hydrocarbon bearing structures. Much of the information gathered thus far has been seismic data, the quality of which is usually poor in this area, geologic mapping and stratigraphic interpretations. Chevron and Fina have been able to identify from this data favorable hydrocarbon source rocks and what appears to be favorable structural traps for oil or gas. There is no indication of whether or not favorable reservoir rocks exist in this location.

The discontinuous nature of the geology in this portion of the Overthrust Belt makes it impractical to extrapolate known subsurface data from drill hole data even a few miles away. The closest drilling in the area was in the Mount Baldy vicinity, approximately six miles from either proposed well site. A dry hole was drilled there by Phillips Petroleum in the 1960s. The information gathered from this drilling, while important in interpreting the overall geologic picture for the area, does not contribute specific information regarding Chevron's or Fina's proposals.

Other oil and gas fields in the northern portions of the Overthrust Belt (Map 3.1) provide general information about the fundamentals of field development. However, each case is unique to the circumstances in that area. Chevron recently drilled a well on the Blackfeet Reservation near Babb that was plugged and abandoned. That well site was located approximately 40 miles to the northwest of the proposed Chevron project area. The geologic structures drilled in the Blackleaf Field about 15 miles to the south have yielded large amounts of natural gas, but have been very limited in size and extent. Very large fields have been discovered in the Wyoming and Alberta portions of the Overthrust Belt (Map 3.1). The wells in Alberta yield enough hydrogen sulfide to make extracting and marketing elemental sulfur profitable. This is not the case in the Blackleaf Field where amounts of hydrogen sulfide are relatively small. The hydrogen sulfide potential of the proposed projects in the RM-1 Unit is not known.

Given the limited knowledge of the potential of the RM-1 Unit for producing hydrocarbons and the mandate to analyze impacts and activities based on information that has scientific backing, the Forest Service and BLM believe that this analysis should consider both Chevron's and Fina's proposals through the production stages. Production is included in the related and foreseeable activities contributing to the cumulative effects of the area. Beyond that, the ID Team has attempted to develop a strategy for addressing the possibilities of various levels of future activity, including field development, using the information presently available (Appendix L). The ID Team concluded that there were three possible reasonably foreseeable outcomes that could result from exploratory drilling of the proposed projects. These are discussed and analyzed in Chapter IV.

Environmental analyses for substantial levels of oil and gas activity and development in the RM-1 Unit cannot realistically be conducted with the subsurface information that is currently available. Adequate information regarding the presence of hydrocarbons and amounts can only be obtained by exploratory drilling and discovery. This document evaluates the effects of implementing the two drilling proposals, as well as the effects of the most likely and reasonably foreseeable actions that would result from a decision to allow exploratory drilling to occur.

Method of Analysis

An ID Team of resource specialists from the Forest Service (as lead agency) and the BLM was responsible for conducting the environmental analysis and documenting the results of the process. A number of individuals and specialists from other state and federal agencies, the Blackfeet Tribe, and industry representatives provided technical expertise and input into the analysis process (see Chapter VII for team and support group membership). A systematic, interdisciplinary method, as described in Forest Service Manual chapter 1950 (Forest Service, 1985), was used to identify issues and concerns, analyze the affected area, formulate alternatives, determine environmental effects of alternatives, evaluate and compare alternatives considered, and recommend a preferred alternative to the responsible official. These subjects are discussed in detail in the appropriate chapters that follow.

The level and scope of analysis disclosed in this EIS, the ID Team membership, and the schedule for its completion were guided by the Bureau of Land Management and Forest Service Study Plan for the Fina Oil and Chemical Federal South Glacier 1-26 APD and the Badger Creek Federal 1-35-2D APD, approved December 23, 1987.

Grizzly Bear Cumulative Effects Model

In order to effectively meet goals to recover the grizzly bear population in the Northern Continental Divide Grizzly Bear Ecosystem and to meet the needs for formal consultation with the U.S. Fish and Wildlife Service, the analysis included use of a computer model to evaluate the cumulative effects of the project and other management activities on grizzly bear habitat.

The Rocky Mountain Front Cumulative Effects Model (Forest Service et al., 1987) uses Geographical Information Systems technology to assess the cumulative effects of human activities on grizzly bear habitat over the entire bear management unit. The model creates two outputs to measure the effect on grizzly bear habitat: 1) Habitat effectiveness-which is a measure of the habitat that is available for grizzly bear populations. (It is determined by comparing the existing habitat with the presence of mans' activities against the existing habitat without the presence of mans' activities); and 2) Mortality risk index-which is an indication of risk to the bear. (This is not a measure of how many bears are lost to the population.) The model first analyzes the present on-going activities (roads, trails, grazing, recreation sites, etc.) and then analyzes the effects of the additional exploration or production activities in regard to the two model outputs. Thresholds have not been set for the habitat effectiveness or mortality risk outputs for the bear management unit. Therefore, the model outputs are a relative ranking between alternatives and existing condition.

The cumulative effects model outputs along with grizzly bear research from the Rocky Mountain Front will be used in selecting a preferred alternative.

View of Whiterock Pass looking westerly into the Badger-Two Medicine area.

E. OIL AND GAS LEASE CONSIDERATIONS AND CONSISTENCY WITH THE FOREST PLAN

Lease M-25173 was issued to Chevron USA on October 1, 1981 for a term of 10 years. The lease covers an area of 1,920 acres of nonwilderness lands (Map 1.2). Chevron formed an exploratory unit in 1986 (Appendix E). They filed an APD in November of 1985 and requested a suspension of the lease terms within the unit pending completion of the agency analysis of the APD.

Lease M-53323 was issued on June 1, 1982 to Fina Oil and Chemical Company. The lease covers an area of 6,247 acres. In October 1983, Fina submitted an APD. An environmental assessment was prepared on their application and a decision was signed on January 31, 1985. The decision was appealed and in August of 1985, the Interior Board of Land Appeals remanded the assessment for additional analysis of four issues. A new decision notice was issued on April 13, 1987 and additional appeals were received. In December 1987, it was decided to combine the analysis of both the Fina and Chevron APDs into a single comprehensive EIS.

1981 Environmental Assessment Oil and Gas Leasing Nonwilderness Lands

In 1980, the Lewis and Clark National Forest had a backlog of over 200 oil and gas lease applications, some of which had been pending since 1971. Over 85 percent of the applications were for lands within the Rocky Mountain Division of the Forest. The *Environmental Assessment Oil and Gas Leasing on Nonwilderness Lands* (Forest Service, 1981) was prepared as an interim document until completion of the Forest Plan. On February 18, 1981, the Regional Forester approved oil and gas lease issuance on the basis of the 1981 Environmental Assessment.

Based on the public scoping conducted for the 1981 Assessment, six alternatives for responding to lease requests were evaluated. They ranged from denial of all lease applications to leasing of all applied for lands with special stipulations to protect surface resources and land uses. The alternatives considered are discussed on pages 31 and 32 of the Environmental Assessment, and are as follows:

1. *No action on lease applications at this time.* This alternative would not lease any lands.

2. *Leasing of all acreage without prior evaluation of occupancy opportunities.* Under this alternative all leases would be issued with Standard Stipulations and the Limited Surface Use Stipulation. Because there is no prior evaluation of occupancy opportunities, some leases with no reasonable opportunity for occupancy could be issued.

3. *Occupancy leasing only of accessible areas which can be adequately protected through the application of standard and special stipulations.* Lease denial or issuance of a no-surface occupancy lease if the application is located entirely within an area which cannot be adequately protected. Under this alternative, areas with surface resources and uses which could not be adequately protected through application of standard and special stipulations would not be recommended for leasing.

4. *Leasing of all acreage with no-surface occupancy.* This alternative would preclude any occupancy activities (e.g. road building, well drilling and pipeline construction) although passive activities (e.g. seismic exploration) would be permitted. If lease applicants decline to accept leases with a no-surface occupancy provision for the entire lease, the Forest Service would then recommend denial of the application. This alternative is a direct result of public responses.

5. *Leasing only of areas currently accessible without construction of new roads.* This alternative would facilitate mineral activities on a limited portion of the Forest. Occupancy activities would take place in areas adjacent to existing roads while passive exploration would be focused on gaining a better understanding of oil and gas potential of the areas. This alternative was a direct result of public responses.

6. *Staged oil and gas exploration and development.* Under this alternative, exploration and development would occur in stages based on sensitivity of surface resources. This could be accomplished by either attaching stipulations to leases on sensitive areas precluding activity until less sensitive areas are explored or by delaying responses to lease applications for sensitive areas. Sensitivity would primarily be determined by wildlife and recreation use of an area. This alternative is a direct result of public responses.

Effects disclosure of these alternatives in the Environmental Assessment (pages 43-47) include the following:

1. Soil, watershed, and air.
2. Wildlife including threatened and endangered species.
3. Rare plants.
4. Vegetation.
5. Social and economic conditions.
6. Recreation.
7. Special uses.
8. Cultural, archaeological, historic, and religious.

Based on the analysis and evaluation described in the Environmental Assessment, it was the decision to recommend to the Bureau of Land Management that leases be issued with occupancy privileges for accessible areas that can be adequately protected through the application of standard and special stipulations (Alternative 3, *Environmental Assessment Oil and Gas Leasing on Nonwilderness Lands*, page 61). Following this decision, the Forest conducted additional site-specific analysis of the acreage requested for lease to determine the specific stipulations, mitigation and other environmental factors which would be considered. Following this analysis, the site-specific stipulations were prepared for the individual lease tracts and forwarded to the BLM for issuance. No appeals were received on the Environmental Assessment nor were any protests filed with the BLM on issuance of the leases and therefore leases were issued to Chevron USA and Fina Oil and Chemical Company in compliance with the 1981 Nonwilderness Leasing Environmental Assessment.

Both leases under consideration here were issued subject to stipulations designed to control occupancy to protect surface resources consistent with the direction in the Nonwilderness Leasing Environmental Assessment. The stipulations are:

1. *Surface Disturbance Stipulation* (form MSO 3100-5). General stipulation which covers 100% of both leases and requires the approval of surface disturbance in advance and environmental analysis be conducted.

2. *Stipulation for Lands Under Jurisdiction of Department of Agriculture* (form MSO 3109-3). General stipulation on both leases outlining procedures and requirements for operations on National Forest lands.

3. *Standard Lease Stipulation* (form MSO 3100-47c) and (MT-3109-1). This applies to 100% of both leases and makes certain requirements of the operator concerning protection and conservation of cultural and paleontological resources, endangered or threatened species, aesthetics, erosion control. Protection of special values or conditions such as flood plains, reservoirs, lakes, ponds, streams, rivers, domestic water supplies, grouse strutting grounds, crucial wildlife winter ranges, elk calving areas, recreation areas, seasonal road closures, steep slopes, and erodible or slumping soils are also included.

4. *No Surface Occupancy Stipulation* (form MSO 3100-55). Sixty-three percent of M-25173 and eighteen percent of M-53323 are covered by this stipulation. It prohibits surface occupancy because of steep slopes and hazardous soils.

5. *Limited Surface Use Stipulation* (form MSO 3100-60). Twenty-nine percent of M-25173 and fifty-seven percent of M-53323 are effected by this stipulation. It is designed to protect soils susceptible to failure and slumping.

6. *Activity Coordination Stipulation* (form MSO 3100-61). One hundred percent of both leases are covered by this stipulation. This stipulation is designed to protect threatened and endangered species such as the grizzly bear and gray wolf. The intent is to control activity over time and space in accordance with the needs of the species.

1986 Forest Plan

On June 4, 1986, the Lewis and Clark Forest Plan and accompanying EIS was approved. This long-range, integrated land and resource management plan provides for integrated guidance for all natural resource management activities. The Forest Plan decisions were based on the analysis and alternative selection in the Final Environmental Impact Statement. The Forest Plan established goals and management direction for the RM-1 Geographic Unit of the Forest and resource standards and stipulations to minimize adverse effects of oil and gas related activity (Forest Plan pages 2-23 to 2-73, pages 3-1 to 3-94). The Forest Plan directed that "All previous resource management plans are replaced by this document" (Lewis and Clark Forest Plan, page 5-2) and further incorporated by reference... the *Environmental Assessment for Oil and Gas Leasing on Nonwilderness Lands*.

A range of alternatives of standards and stipulations for oil and gas leasing and field development and areas that will continue to be available for leasing was considered in the Forest Plan, and are shown on Figure 2.15 in Volume 1 of the EIS (page 2-80). Specific Alternatives considered in the Forest Plan for oil and gas leasing are as follows (Forest Plan pages 2-12 to 2-30 and Record of Decision, page 4):

> *No Action Alternative* - This Alternative maintains the present course of action, it continues the direction of existing plans, and was required by NEPA. Specific stipulations on leases and management requirements in the RM-1 Unit would continue to be directed by the *Environmental Assessment Oil and Gas Leasing on Nonwilderness Lands* (Forest Service, 1981).
>
> *Alternative A* - This Alternative was developed in response to the direction in the Forest Rangeland and Renewable Resources Planning Act of 1974 and emphasizes high levels of commodity outputs. Specific direction is that oil and gas leases would have only standard stipulations to protect surface resources. Existing leases in the RM-1 Unit would be reviewed and made consistent with the direction in the alternative.
>
> *Alternative B* - This Alternative would increase the use of the Forest resources while maintaining a variety of recreation opportunities. Specific stipulations on leases in the RM-1 Unit would be similar to those contained on the existing leases.
>
> *Alternative C* - The objective of this Alternative would be to increase the Forest's wildlife program. Oil and gas leasing and development would be allowed; however, there would be more restrictions. Semi-primitive areas would be leased with no-surface occupancy stipulation. Wildlife timing restrictions and additional no-surface occupancy stipulations would be added to M-25173, and M-53323 would be similar to the present lease.
>
> *Alternative D* - This Alternative would respond to the increasing national and local demand for livestock grazing and outdoor recreation. Stipulations would be similar to those issued under *Alternative C*.
>
> *Alternative E* - Timber harvest and livestock grazing would be emphasized under this alternative. Lease stipulations for the RM-1 Unit would be similar to existing stipulations.

Alternative F - This Alternative would increase the use of Forest resources and would maintain dispersed recreation opportunities in a semi-primitive setting. Leasing stipulations would be similar to the existing leases.

Alternative G (Preferred Alternative) - Alternative G would increase the use of the Forest resources while protecting wildlife and recreation opportunities. Lease stipulations and management direction would be similar to those issued under the *Environmental Assessment Oil and Gas Leasing on Nonwilderness Lands* (Forest Service, 1981). In addition, refined project specific mitigation and monitoring objectives and permitting requirements were defined in the Forest Plan.

Alternative H - This Alternative would increase wilderness classification while increasing commodity production. Lands available for leasing would be decreased by 664,000 acres. None of the RM-1 Unit would be designated wilderness under this alternative. The stipulations would be similar to the existing leases.

Alternative I - Alternative I would increase the use of Forest resources while providing diverse wildlife habitat and maintaining recreation opportunity. Stipulations on oil and gas leases in the RM-1 area would be similar to the existing leases.

Alternative J - This Alternative would increase lands recommended for wilderness over the preferred alternative and continue management of other resources similar to the preferred alternative. About 79,000 fewer acres would be available for leasing on the Forest. None of the RM-1 Unit would be designated wilderness under this alternative. The stipulations would be similar to existing leases.

Alternative K - Alternative K would increase the Forest wildlife program, while maintaining dispersed recreation opportunities in a primitive setting. Additional no-surface occupancy stipulations would be added to M-25173, and M-53323 would be similar to the present lease.

In order to gain an understanding and disclose the effects of oil and gas activity on other resources, a "most probable" and a "large discovery" hypothetical field was created and displayed in the Forest Plan (Forest Plan, page 4-5). The Forest Plan EIS disclosed the environmental impacts of development of a large natural gas field in the vicinity of the subject proposals (Forest Plan EIS, pages 4-76 to 4-96). The field was analyzed and effects disclosed on a wide variety of surface resources and shown on Tables 4.27 and 4.28 of the EIS.

The 1986 Forest Plan decision was to implement Alternative G to guide the management of the Lewis and Clark National Forest for the next 10 to 15 years. Specific long-range standards and long-range goals and objectives were established (Forest Plan, pages 3-1 to 3-94). The 1986 Forest Plan Record of Decision specifies that drilling and associated road construction will be handled on an individual basis with environmental analysis. Should discoveries be made, environmental analysis on field development will be conducted. Any new leases or re-issuance of leases will undergo additional analysis as required by NEPA and will meet the overall direction and stipulations outlined in the Forest Plan.

Consistency of Chevron and Fina Leases with Forest Plan Decisions

Table 1.1 displays a comparison of standards and management direction in the Forest Plan, the existing leases and the current EIS. The table addresses Forest Plan Management Standard G-2, oil and gas leasing, exploration drilling, field development, and production (see Appendix C).

Table 1.1
Consistency of Chevron and Fina Leases with Forest Plan Decisions

The following standards were developed to implement the goals and objectives developed in the Forest Plan with respect to oil and gas activity (Forest Plan page 2-56, Management Standard G-2).	The following is a comparison of existing lease stipulations and the current EIS analysis with the Forest Plan standards.		
Forest Plan Standard G-2	M-25173	M-53323	Consistency
(1) Road construction will not normally be permitted on slopes greater than 60 percent. Drill pads will not normally be permitted on slopes greater than 40 percent. Exceptions to these slope restrictions on occupancy may be made when project analysis demonstrates that occupancy on steeper slopes is environmentally acceptable.	No Surface Occupancy Stipulation (NSO) applied to 63% of the lease in response to slope and landtype concerns (MSO 3100-55).	NSO stipulation applied to 18% of the lease.	Standard implemented and consistent with Forest Plan (Appendix A).
(2) Restrict occupancy within the flood plain or riparian area of streams and their tributaries that are classified as "highest value", "high value", and "substantial value" habitat for the Upper Missouri cutthroat trout or having a Fisheries Resource Value of 2 or better.	Standard Stipulation (MSO 3100-47c) applied to 100% of the lease.	same	Standard implemented, further analysis conducted in the EIS (Chp.IV,1.B. and IV.2.B.,Appendix A).

Forest Plan Standard G-2	M-25173	M-53323	Consistency
(3) Apply the Limited Surface Use stipulation to the following landtypes: 14B, 14C, 22, 25C (Severe cut-bank failure potential), 14K, 23A, 25A, 25B, 41, 42, 177 (Moderate cut-bank failure potential)	Limited Surface Use stipulation (MSO 3100-60) applied to 29% of the lease.	Limited Surface Use stipulation applied to 57% of the lease.	Standard implemented, consistent with Forest Plan, further consideration in project design phase as discussed in Chp.IV.1B and IV.2.B.
(4) Minimize fire potential by applying standard stipulations and: --Adhere to Montana State Forest Fire Regulations. --Prohibit or limit activity during high fire danger periods.	Standard Stipulation applied to 100% of the lease (MSO 3100-47c).	same	Standard implemented, consistent with Forest Plan (Appendix A).
(5) Protect existing uses and rights, such as power lines, telephone lines, irrigation canals, and cemeteries by the no-surface occupancy stipulation.	None identified	None identified	Standard consistent, further analysis conducted both on-lease and off-lease.
(6) Conduct on-the-ground inventories for rare plant species before surface disturbing activities are permitted in landtypes cited as being in rare plant habitat.	Threatened and Endangered plant species protected by Standard Stipulation (MSO 3100-47c).	same	Standard implemented consistent with Forest Plan. Further analysis conducted (Chp.IV.1.I., and IV.2.I., Chp.V-Vegetation, Appendix H).
(7) Protect cultural resources by implementing the standard stipulations.	Standard Stipulation on lease (MSO 3100-47c)	same	Standard implemented and consistent with Forest Plan. Further analysis conducted (Chp. IV.1.L. and IV.2.L., Chp. V-Cultural,Appendix M).

Forest Plan Standard G-2	M-25173	M-53323	Consistency
(8) Notify the Blackfeet Tribe of all exploration drilling and development proposals within the Treaty Lands on the Rocky Mountain District (North End Geographic Unit, RM-1).	Blackfeet Tribe notified prior to lease issuance, *Nonwilderness Leasing Environmental Assessment* (page 64).	same	Standard implemented and consistent with Forest Plan. A number of specific meetings were held during the EIS analysis (Chp.VII.C).
(9) Protect Threatened and Endangered species through Section 7 of the Endangered Species Act (consultation procedures), the standard stipulations, the Activity Coordination Stipulation (MSO 3100-61), and the use of the Interagency Guidelines (Appendix I).	Lease subject to the Standard Stipulation (MSO 3100-47c) and the Activity Coordination Stipulation (MSO 3100-61).	same	Standard implemented consistent with Forest Plan (Appendix F and G).
(10) Apply wildlife habitat stipulations to leases, for the protection of important wildlife habitat according to the Interagency Guidelines (Appendix I). Not all important habitat is inventoried. Therefore, additional restrictions may result from the environmental analysis for a specific project proposal.	None Identified	Wildlife timing restrictions applied to 48% of the lease to protect Elk winter range (MSO 3100-55).	Standard implemented, consistent with Forest Plan. Additional habitat analysis conducted and restrictions developed.
(11) Follow Management Standard L-4, Maintenance and Construction of Roads, Trails, and other Facilities, when constructing roads, drill pads, or pipelines.	Standard stipulations applied to the lease (MSO 3100-47c).	same	Standard implemented, consistent with Forest Plan. Further transportation analysis conducted.
(12) Construct roads according to the transportation corridors identified on Geographic Unit Maps.	Standard stipulations applied to 100% of lease (MSO 3100-47c).	same	Standard implemented consistent with Forest Plan. Further transportation analysis conducted.
(13) Evaluate roads constructed for oil and gas exploration and development as to their value in managing surface resources.	Not identified.	same	Standard implemented, consistent with Forest Plan, further transportation analysis conducted.

Forest Plan Standard G-2	M-25173	M-53323	Consistency
(14) Follow Management Standard F-3, Soil and Water Protection, in site preparation and reclamation.	Standard stipulation applied to 100% of lease (MSO 3100-47c).	same	Standard implemented consistent with Forest Plan, further analysis conducted (Chp. IV,1.B., and IV.2.B., Chp. V-Water Resources).
(15) Implement, as needed, monitoring programs to ensure compliance with the preceding guidelines and other management guidance. As a minimum the monitoring would include wildlife, cultural resources, water quality, and effectiveness of road closures.	Not needed.	same	Standard implemented, consistent with Forest Plan. Monitoring plans established for water resources, wildlife, vegetation, and cultural resources (Chp. V).

Current EIS

In addition to considering the drilling and related road access requests submitted by Chevron USA and Fina under their current leases, additional alternatives were analyzed which involved different management and mitigation mixes which in some cases would result in changes to the existing lease terms and conditions of approval. The alternatives and their relationship to the existing leases, and past leasing decisions are as follows:

1. *Alternatives 12 and E, No Action*. The effects of these alternatives would be to deny the Surface Use Plan of Development and the APDs, and preclude occupancy on the leases, and in effect this would result in the equivalent of a 100% no-surface occupancy lease. These would be similar to Alternatives C, D, and K in the Forest Plan and similar to alternatives 1, 2, 4, 5 and possibly 6 in the *Environmental Assessment Oil and Gas Leasing on Nonwilderness Lands* (Forest Service, 1981).

2. *Alternatives 8, 9, 10, F-8, and F-9*. These alternatives would result in 100% no-surface occupancy off-lease, and occupancy for exploration purposes on-lease only. It would be similar to Forest Plan alternatives C, D, F, and possibly I and K and alternatives 2, 3, 5 and possibly 6 of the *Environmental Assessment Oil and Gas Leasing on Nonwilderness Lands* (Forest Service, 1981).

3. *Alternatives 1A, 1B, 2, 6A, 6B, 7A, 7B, A2, B2, C2, and D1*. These alternatives provide for occupancy on the lease subject to surface use stipulations and conditions of approval of the Forest Service designed to protect surface resources. These alternatives are similar to Forest Plan alternatives B, E, F, G, H, I, and J, and similar to alternatives 3, 6 and possibly 2 of the *Environmental Assessment Oil and Gas Leasing on Nonwilderness Lands* (Forest Service, 1981).

4. *Alternatives 3, 4, 5, 11, A1, A, B, C and D*. These alternatives would in effect reflect leasing with few stipulations to protect surface resources. These alternatives would be similar to alternatives A, and possibly E, F, H and I, in the Forest Plan and Alternative 2, of the *Environmental Assessment Oil and Gas Leasing on Nonwilderness Lands* (Forest Service, 1981).

The initial leasing decision was based upon an environmental analysis documented in the *Environmental Assessment Oil and Gas Leasing on Nonwilderness Lands* (Forest Service, 1981), successive analyses for the Forest Plan EIS and for this current EIS have directly and indirectly evaluated the environmental effects of leasing, exploration and development. The site-specific analysis documented in this EIS evaluates the necessity of various mitigation measures regulating use and occupancy of the leased lands, alternative actions and appropriate action-specific mitigation, and the direct, indirect, and cumulative effects of these actions.

CHAPTER II. ALTERNATIVES INCLUDING THE PROPOSED ACTION

This section discusses the alternatives considered by the ID Team in the analysis of the Chevron and Fina APDs. A separate discussion of alternatives pertains to each project. Section 1 discusses alternatives responsive to the Chevron Proposal. Section 2 discusses alternatives responsive to the Fina proposal. Combined alternative effects relating to these projects is discussed in section 3. Alternatives were identified from a number of sources. Chevron, in its initial application, identified five access routes to the drill site. A preferred access route was also identified by Fina (Bureau of Land Management and Forest Service, 1985). Public comments from the scoping effort suggested additional alternatives to the ID Team (Appendix D). Other alternatives were identified by the ID Team. In the identification of alternatives, consideration was given to issues and concerns identified by other agencies and members of the public, to National Forest management requirements, and to the economic and technical limitations of the industry.

1. ALTERNATIVES FOR THE CHEVRON PROJECT

The information discussed above led to the identification of 15 preliminary alternatives for the Chevron proposal. Five of these alternatives were eliminated in the early stages of detailed analysis because they were determined to be technically or economically unreasonable. The reasons for dropping these alternatives are discussed in Section A below. The ten remaining alternatives, including the company proposal and the "no action" alternative, were analyzed in depth. These alternatives are described in Section B. More specific information relevant to alternatives reviewed by the ID Team is contained in the project files (Yogerst, 1986, 1986a). Section C indicates which alternative is the preferred choice of the Forest Service and BLM in responding to Chevron's application. Section D compares the preferred alternative and the other alternatives in terms of environmental, social, and economic consequences. The information in Table 2.1 is a summary comparison of detailed information presented in chapter IV.1. of this EIS.

A. CHEVRON ALTERNATIVES ELIMINATED FROM DETAILED STUDY

A summary description of the five alternatives eliminated from detailed study, and the rationale for their elimination are discussed below. An alternative that would recommend the entire Badger-Two Medicine Roadless area for wilderness was not given detailed study because the wilderness allocation issue was addressed in the Lewis and Clark Forest Plan EIS (Chapter II, page 7) and Record of Decision (ROD, page 14).

Alternative 3 - Badger Creek Route

Roaded access would be from the Bureau of Indian Affairs (B.I.A.) Route 2 (NW1/4 Section 25, Township 30 North, Range 11 West) up the Badger Creek canyon and the North Fork of Badger Creek to the well site. The route would cross the North Fork of Badger Creek in approximately the SW1/4 Section 34, T.29N., R.12W. This route was originally identified by Chevron as alternative access to the well site. This alternative was eliminated from detailed study for two reasons. First, the route is poorly suited for road construction. Approximately 90% of the 13.3 miles of required road construction would be in landtypes that are considered unsuitable for roads (Holdorf, 1981), and would cause excessive degradation of the surface. Second, the route is poorly suited for development activities such as pipeline and utility corridors. Such facilities could not realistically be constructed and maintained without access roads. In addition, approximately 4.9 miles of the route is poorly suited for conventional pipeline burial. Much of this route would traverse lengths of wet or poorly drained soils, making pipeline construction and maintenance impractical. Management direction requires that these lands be leased only if the leases contain a "no-surface occupancy" stipulation (Federal Lease stipulations are discussed in detail in Appendix L).

Alternative 4 - Sawmill Creek Route

Roaded access would be via B.I.A. Route 2 (NW1/4 Section 25, T.30N., R.11W.), up Sawmill Creek, southward into Badger Creek canyon, and up the North Fork of Badger Creek to the well site. The route would cross the North Fork of Badger Creek in approximately the SW1/4 Section 34, T.29N., R.12W. This route was originally identified by Chevron as alternative access to the well site. This alternative was eliminated from detailed study for essentially the same reasons discussed for *alternative 3*. Approximately 3.1 miles of the total 17.1 miles of road construction would traverse "no-surface occupancy" landtypes (Appendix L).

Alternative 5 - Morrison-Puzzle Creek

Route access would be from the Morrison-Puzzle Creek roads on the Flathead National Forest (beginning in either the NW1/4 Section 35, T.29N., R.13W., or the NW1/4 Section 11, T.28N., R.13W.). This route would proceed eastward over the Continental Divide near Bullshoe Mountain, down Kipp Creek and across the North Fork of Badger Creek to the well site. This route was originally identified by Chevron as alternative access to the well site.

This alternative was eliminated from detailed study for essentially the same reasons as *alternative 3*. The soils on the Flathead National Forest overlie dip-sloping shales, making them highly susceptible to slumping and mass failure (Forest Service, 1973). The stability problems experienced from past conventional road construction and maintenance practices confirm such problems. Even if special engineering procedures are used in road design and construction to assure a stable access road in the Puzzle Creek area, there are numerous stability problem areas along the existing Morrison and Skyland Creek roads (Martinson, 1986). The problems are severe enough that they would preclude any realistic opportunity to maintain a pipeline operation.

In addition, this route traverses 3.3 miles of area which was identified as "no-surface occupancy" in the Lewis and Clark National Forest Plan (Forest Service, 1986a) (No surface occupancy stipulations are discussed in Appendix L.). The ID Team concluded that the Morrison-Puzzle Creek route could be used as an exploration route with the incorporation of special road design procedures to accommodate oil and gas equipment; however, the inherent unsuitability of the soils would make pipeline planning, construction, and operation impractical. In light of these problems and the "no-surface occupancy" limitations the ID Team eliminated this route as undesirable for the purpose of accessing Chevron's proposed drill site.

Alternative 10 - Helicopter Mobilization from Lower Badger Creek

Under this alternative, no access roads would be constructed. Transportation of the drill rig to and from the well site, and transportation of workers and supplies during the drilling operation would be accomplished by helicopters (Refer to Appendix N for information about helicopter mobilization). A helicopter staging area would be located on the Blackfeet Indian Reservation between B.I.A. Route 2 (NW1/4 Section 25, T.30N., R.11W.) and the National Forest boundary. The flight corridor to and from the well site would be via the Badger Creek canyon.

This alternative was one of three alternatives identified by the ID Team to respond to requests that helicopter alternatives be considered in the analysis. The ID Team reviewed three helicopter alternatives (*alternatives 8, 9 and 10*) from the standpoint of user safety, effects on surface resources, efficiency of operations, and overall cost to conduct the operations. *Alternatives 8 and 9* are included for detailed analysis (Section B). *Alternative 10* was eliminated from detailed study by the ID Team on the basis of flight safety and efficiency of operations. Of the three alternatives, the Badger Creek alternative is the least desirable because the flight path would be located in the deep, narrow, and rugged Badger canyon. Operation in the canyon during periods of unstable air and wind would pose an unacceptable safety risk. This alternative is also less desirable from an operation efficiency standpoint because visibility from within the canyon corridor would be limited to the immediate operating area. As a consequence, additional flying time would likely be incurred in adverse or cloudy weather to avoid weather conditions that can not be seen well in advance of the flight path. This would add to the overall cost of the operation.

Alternative 11 - Locate the well site on Northeast Face of Goat Mountain - (SE1/4 Section 35, T.29N., R.12W.)

Access would be via helicopter with staging areas and travel corridors as identified in *alternatives 8, 9 and 10*. This well site location was identified by Chevron, and is considered by Chevron to be the most economical well site location for hitting their subsurface target.

This well site location was reviewed by the Forest Service and the BLM during the summer of 1985, and found to be unacceptable as an exploration alternative for several reasons. Access to the well site would require the construction of at least 0.5 miles of road on Goat Mountain across lands that were identified as unsuitable for surface occupancy on Chevron's lease. (No surface occupancy stipulations are discussed in Appendix L.) The ID Team reviewed the proposal, considering helicopter access as a means to overcome the no surface occupancy restriction. While helicopter mobilization may be technically feasible, the alternative does not offer Chevron the option to develop the well should the well prove to yield oil and/or gas. The ID Team has concluded that it is unreasonable to study in detail a helicopter alternative that does not provide the lessee an opportunity to develop the site and recover the drilling costs should the well be a producer.

No other well site alternatives have been identified by Chevron or the ID Team. Chevron has found the currently proposed well site to be acceptable. The ID Team has not identified alternative well sites because of the agencies' lack of adequate subsurface information of the target area, and because of the need to respond to requests of the lessee rather than to impose decisions that may not be in the interest of the lessee.

B. CHEVRON ALTERNATIVES CONSIDERED IN DETAIL

The following alternatives were identified and evaluated in detail: 1) the location and type of initial access to be permitted (access alternatives); and 2) post drilling or post operation reclamation. Reclamation considers the final reshaping and revegetating of the disturbed areas. It also considers post-drilling road use and long-term access management for the project area. Alternative mitigation is discussed in Chapter V.

Alternatives

Ten alternatives were subjected to a detailed analysis. The alternatives are described in the maps and discussions that follow. In the evaluation of these alternatives, consideration was made of the issues and concerns identified, to economic and technical limitations of the industry, and standards and requirements contained in the Lewis and Clark National Forest Plan (Forest Service, 1986a). An analysis of possible development actions, should the well be a producer, is included in *alternatives 2, 6A, 6B, 7A and 7B.*

Alternative 1A - South Fork of Two Medicine Bottom/Pike Creek Road

Road access would be from US Highway 2 via the Pike Creek road, along the old South Fork of Two Medicine route and up the North Fork of Badger Creek to the proposed well site (Map 2.1). Because this route traverses wetland and floodplain landtypes, it is considered an alternative for temporary, low standard access, and is not suited for long-term oil and gas development. Should an application be made to produce from the well, other alternative access routes, such as *alternatives 2, 6A, 6B, 7A and 7B* would need to be considered. This route was originally identified by Chevron in its APD (Appendix B).

Alternative 1B - South Fork of Two Medicine Bottom/Sec. 28 and 29

Road access would be from US Highway 2, beginning at the present Forest Service trailhead in the NE1/4 NW1/4 of Section 29 and extending through Sections 28 and 29, T.30N., R.13W., along the old South Fork of Two Medicine route, and up the North Fork of Badger Creek to the proposed well site (Map 2.1). This route was identified by the ID Team as a variation of *alternative 1A* to keep oil and gas related activity away from the Summit Campground-Marias Pass vicinity.

Because this route partially traverses wetland and floodplain landtypes, it is considered an alternative for temporary, low standard access only, and is not suited for long-term oil and gas development. Should an application be made to produce from the well, other alternative routes identified, such as *alternatives 2, 6A, 6B, 7A and 7B* would need to be considered.

Alternative 2 - Whiterock Pass

Road access would be via Forest Service Road 9128 to Palookaville. Road construction and reconstruction through Whiterock Pass and along the North Fork of Badger Creek would be necessary (Map 2.1). This route was originally identified as an alternative route by Chevron.

Alternative 6A - South Fork of Two Medicine Westside/Pike Creek Road

Road access would be from US Highway 2 via Pike Creek Road along the lower slope on the west side of the South Fork of the Two Medicine River, then up the North Fork of Badger Creek to the proposed well site (Map 2.2). This route was identified by the ID Team to get road activity out of the Two Medicine River bottom. In addition, this route would avoid the need for a bridge across the South Fork of Two Medicine River.

Alternative 6B - South Fork of Two Medicine Westside/Sec. 28 and 29

Road access would be the same as *alternative 6A*, except the access would begin at the Forest Service trailhead and extend through Sections 28 and 29, T30N, R13W, before proceeding up the Two Medicine River (Map 2.2). This route was identified by the ID Team to get road activity out of the Two Medicine River Bottom and away from the Summit Campground-Marias Pass area. In addition, this route would avoid the need for a bridge across the South Fork of Two Medicine River.

Alternative 7A - South Fork of Two Medicine Eastside/Pike Creek Road

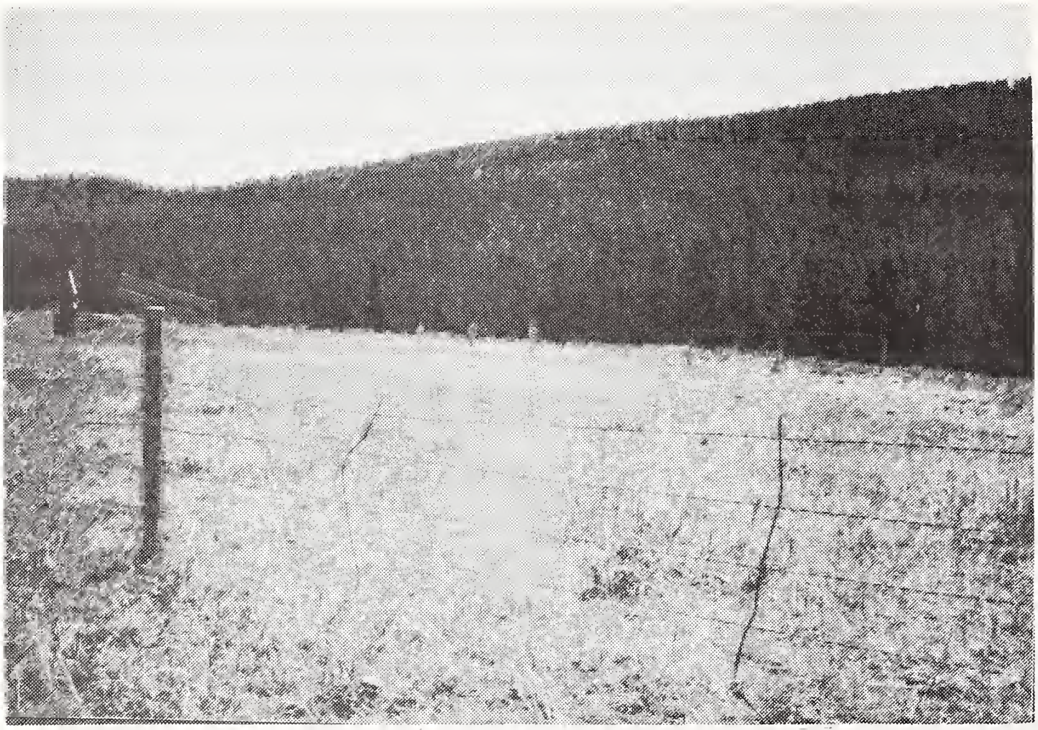
Road access would be from US Highway 2 via Pike Creek Road across the South Fork of Two Medicine in Section 28, along the lower slope on the east side of the South Fork of Two Medicine drainage, and up the North Fork of Badger Creek to the proposed well site (Map 2.3). This route was identified by the ID Team to get road activity out of the bottom of the South Fork of the Two Medicine River. A bridge across the South Fork of the Two Medicine River would be required.

Alternative 7B - South Fork of Two Medicine Eastside/Sec. 28 and 29

Road access would be the same as *alternative 6A*, except the access would begin at the Forest Service trailhead and extend through Sections 28 and 29, T.30N., R.13W., before proceeding up the Two Medicine River (Map 2.3). This route is similar to *alternative 7A* except it does not go through the Summit Campground-Marias Pass area.

View of Goat Mountain

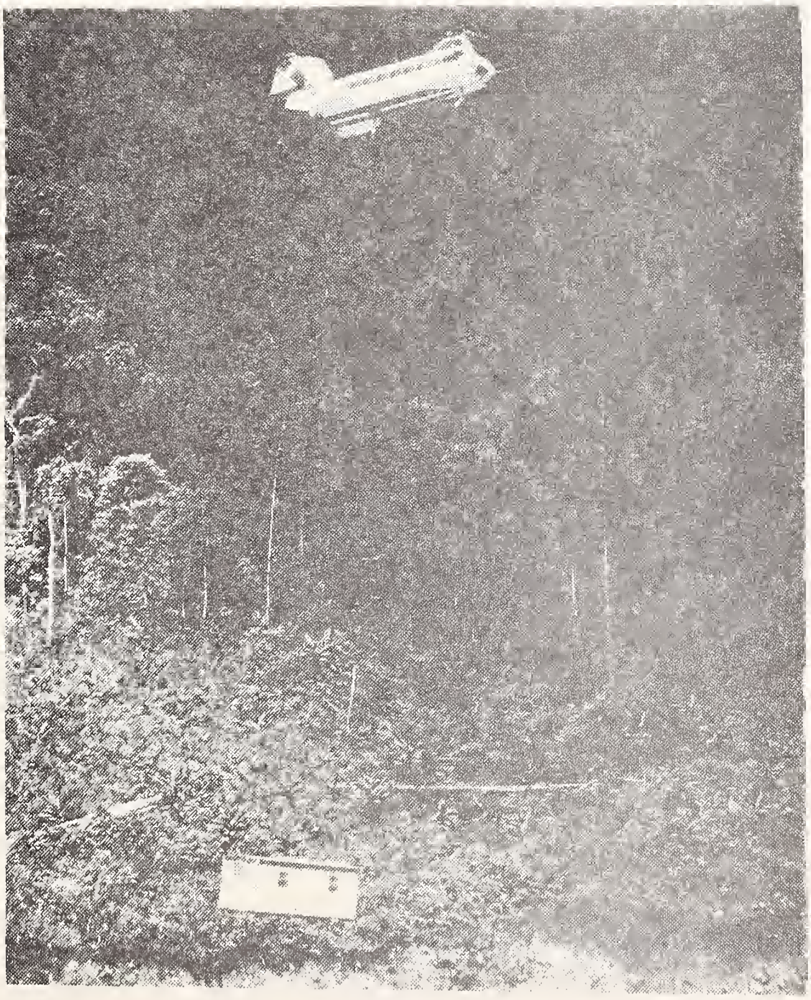
View of North Fork of Badger Creek (looking west). This area would provide an access Corridor for all of Chevron's roaded alternatives.

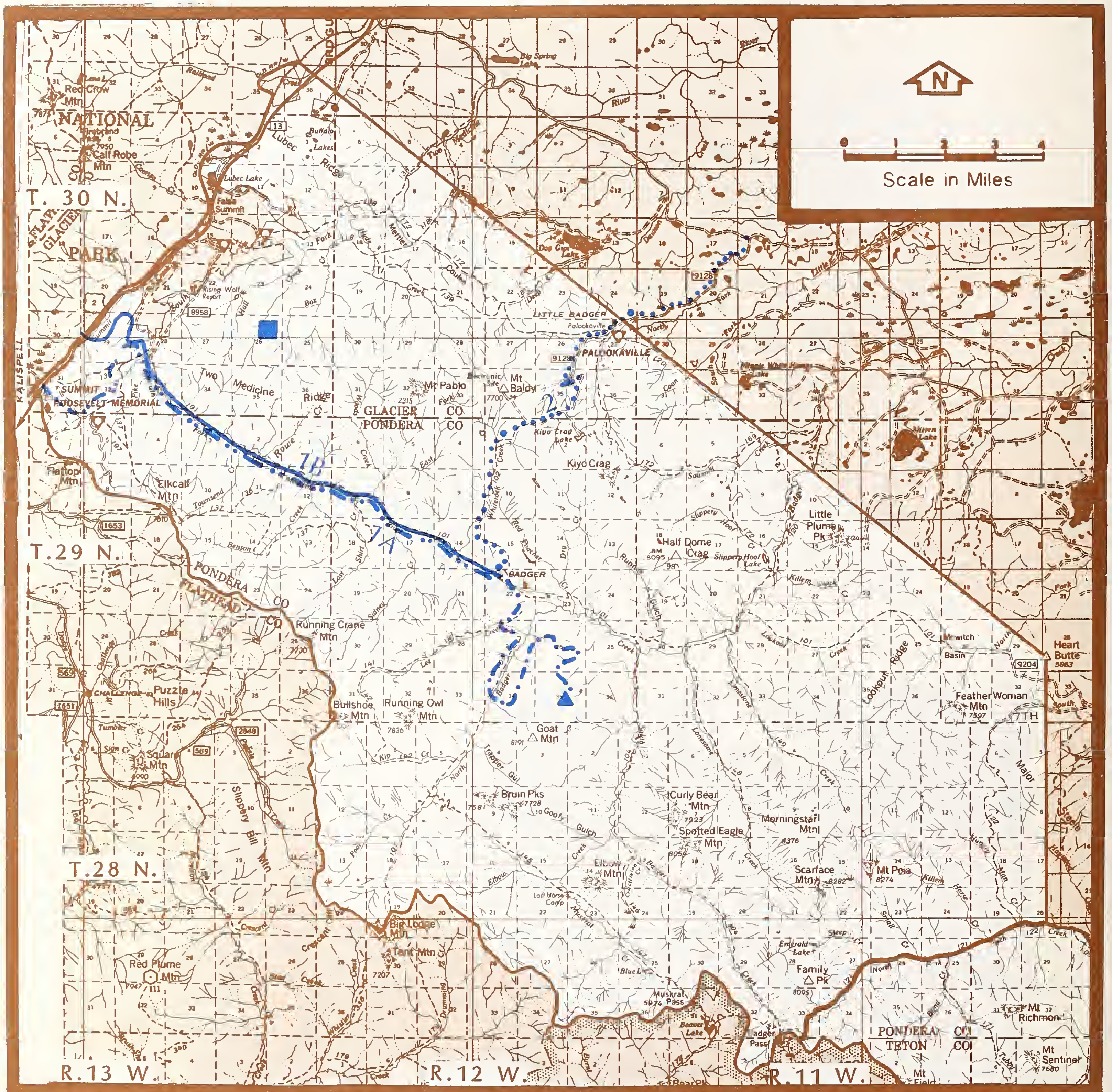


Forest Service trailhead viewed from US Highway 2. This point would serve as access from US Highway 2 for Chevron's alternatives 1B, 6B, 7B and 8, and Fina's alternatives B2 and F8.

View from the existing road over Whiterock pass looking south toward Kiyo Crag (Route of Chevron's alternative 2).

Views of typical helicopter operations. Helicopter mobilization would apply to Chevron's alternatives 8 and 9, and Fina's alts. F8 and F9. Photos courtesy of Columbia Helicopters.



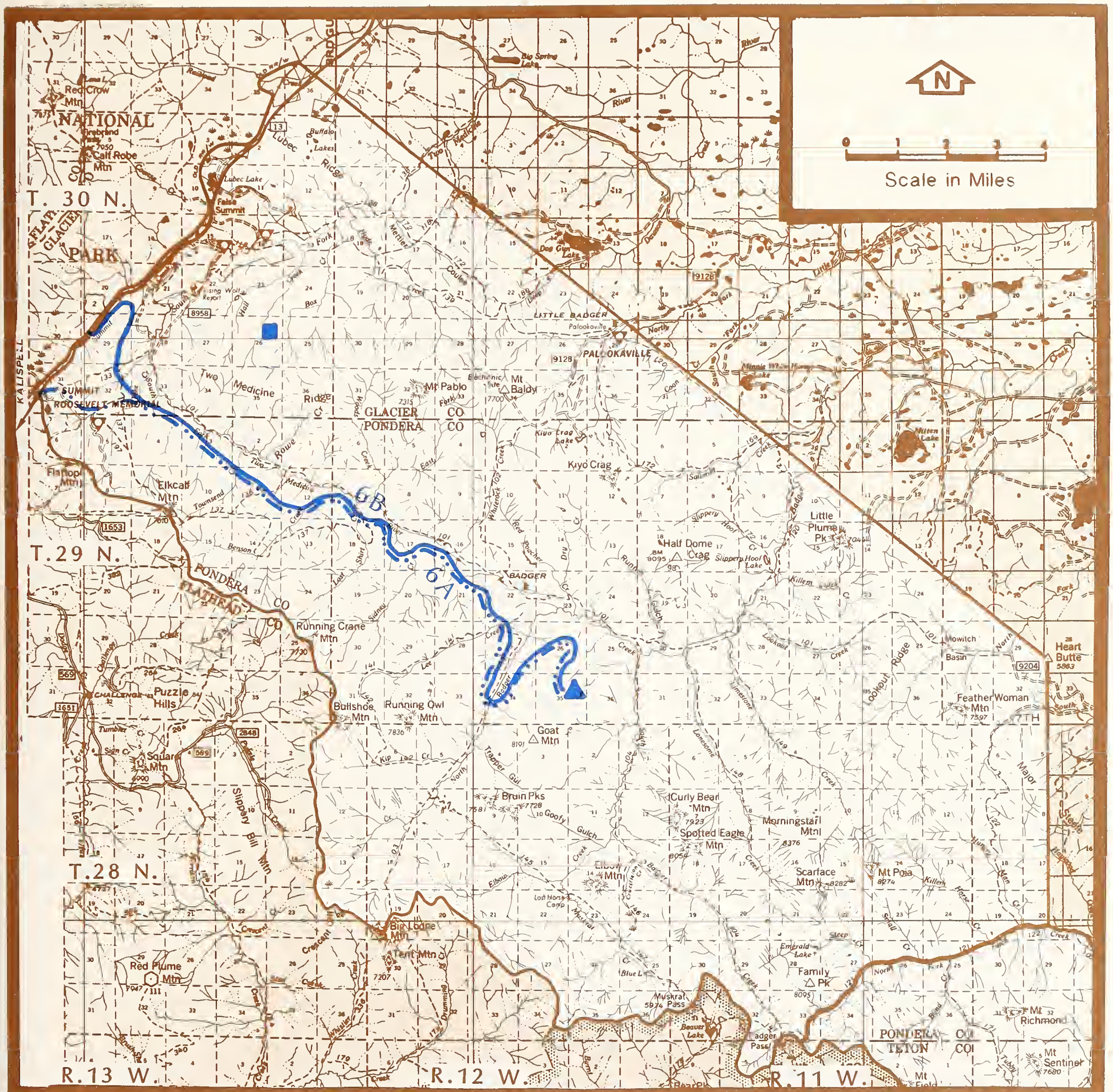


LEGEND

- ─·· ─ Alternative 1A
- ─── Alternative 1B
- ······· Alternative 2
- ─·─ Route Common to Alternatives 1A, 1B, and 2
- ▲ Chevron Well Site Location
- ■ Fina Well Site Location

MAP 2.1

ALTERNATIVE ROAD LOCATIONS 1A, 1B, AND 2



LEGEND

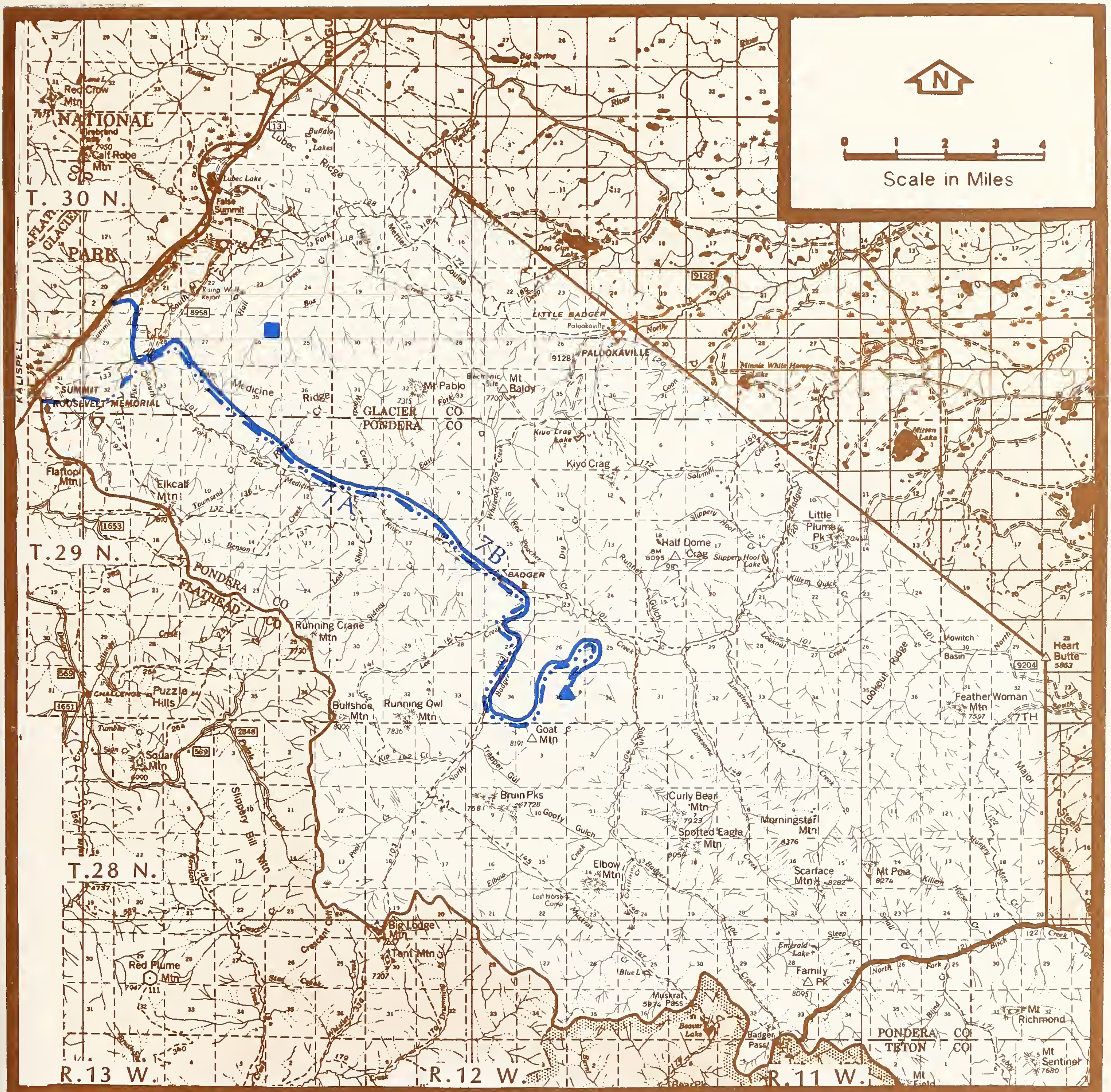
-··- Alternative 6A

—— Alternative 6B

▲ Chevron Well Site Location

■ Fina Well Site Location

MAP 2.2 ALTERNATIVE ROAD LOCATIONS 6A AND 6B



LEGEND

- ·· — Alternative 7A
— Alternative 7B
▲ Chevron Well Site Location
■ Fina Well Site Location

MAP 2.3 ALTERNATIVE ROAD LOCATIONS 7A AND 7B

Alternative 8 - Helicopter Mobilization from Lower South Fork of Two Medicine

Access would be via helicopter from the lower South Fork of Two Medicine River area, and up the east side of the Two Medicine drainage to the proposed well site. The helicopter staging area would require approximately one mile of road construction from US Highway 2 to the approximate center of Section 29, T.30N., R.13W. (Map 2.4). Helicopter alternatives were designed by the ID Team in response to public concern about roadless areas, and wildlife and safety considerations. Specific information about helicopter operations in relation to a drilling program can be found in Appendix N.

This alternative does not address development aspects of the Chevron project. Should an application be made to produce from the well, other access routes such as *alternatives 2, 6A, 6B, 7A, and 7B*, would be considered because road access would be needed to facilitate production.

Alternative 9 - Helicopter Mobilization from Palookaville via Whiterock Pass

Access to the well site would be via helicopter from the vicinity of Palookaville, and over Whiterock Pass. The staging area would be adjacent to Forest Service Road 9128 at the NE1/4 of Section 25, T30N, R12W (Map 2.4). The staging area location was identified to remove activity from Glacier National Park.

This alternative does not address development aspects of the Chevron project. Should an application be made to produce from the well, other access routes such as *alternatives 2, 6A, 6B, 7A, and 7B*, would be considered because road access would be needed to facilitate production.

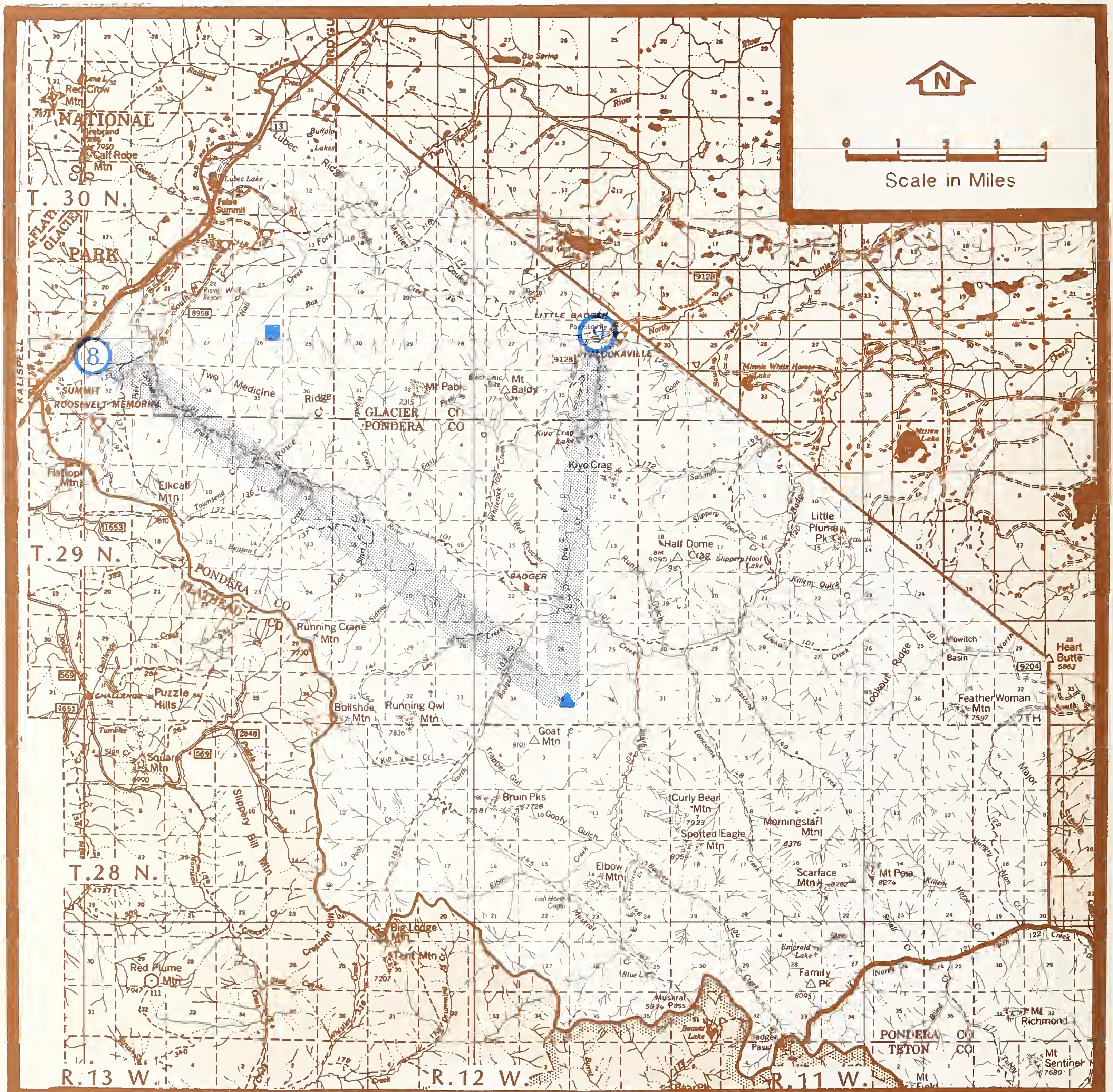
Alternative 12 - APD Not Approved

Under this alternative, Chevron's APD would be denied. Adoption of this alternative would result in a continuation of current management direction and practices. Previously issued oil and gas leases would remain in effect. Future APDs may still be submitted by Chevron and other leaseholders in the area. Denial of Chevron's APD would not automatically result in denial of future applications for exploration and development. It would not change the status of the Fina proposal. This alternative is required by NEPA regulations.

Post Drilling Reclamation

The Lewis and Clark National Forest Plan (Forest Service, 1986a) requires reclamation be conducted following completion of oil and gas activities (as well as other activities) in the RM-1 Unit. Concerns during the Chevron public comment period about what type of reclamation would be required following completion of Chevron's project. Numerous reclamation strategies were suggested.

In response to the Forest Plan requirements and public concerns, the ID Team conducted an analysis of reclamation strategies and options suitable for application in the RM-1 Unit. This analysis is documented in Appendix K. There were seven different options identified and evaluated. These options range from leaving the access roads open and available for public use, to full reclamation including reshaping of the road prism to a near-natural contour and re-vegetating. While there are advantages and disadvantages to each option, it has been concluded by the ID Team that *Option 7* is most compatible with management of other planned resources and uses, is compatible with the Lewis and Clark National Forest Travel Plan (Forest Service, 1984), and best satisfies the issues and concerns aired by the public. This option requires full reclamation of newly constructed roads, and specifies that existing roads that could be used for oil and gas access, such as the Pike Creek Road and Road 9128 at Palookaville, should be partially reclaimed, and use-controlled to accommodate present use patterns. A detailed reclamation strategy for each alternative is described in Appendix K.



LEGEND

⑧ Alternative 8 Staging Area	▲ Chevron Well Site Location
⑨ Alternative 9 Staging Area	■ Fina Well Site Location
▨ Helicopter Flight Path	

MAP 2.4

ALTERNATIVES 8 & 9

C. IDENTIFICATION OF THE PREFERRED CHEVRON ALTERNATIVE

Alternative 2 is the Forest Service and BLM preferred alternative. The preferred alternative may be revised or modified in the Final EIS based on comments received on this Draft EIS and site specific investigations conducted for the preferred corridor. Site specific investigations would include road and well site location (staking) and design, cultural resource clearance, botanical surveys, and identification of appropriate mitigation measures.

D. SUMMARY COMPARISON OF CHEVRON ALTERNATIVES

Table 2.1 summarizes the information from Chapter IV - Environmental Consequences, and compares the various alternatives in terms of physical, biological, social and economic effects. Only those alternatives analyzed in detail in Chapter IV.1 are included in Table 2.1. The discussion in the table is organized to address the issues and concerns as they appear in Section I.C. Fifteen issues, designated by capital letters A through O are used to describe the effects to the physical, biological, social, and economic environment. These effects are also described by alternative for the alternatives analyzed in detail. The effects are listed as unmitigated, and mitigated where applicable. Residual unmitigated effects are listed separately in Table 2.1 under the following headings: P. Unavoidable Adverse Effects; Q. Anticipated Long-Term Effects; and R. Irreversible and Irretrievable Effects. These are also discussed in more detail in Chapter IV.1.

These effects and mitigation measures are discussed in detail in Chapter IV.1. Additional mitigation measures that may be incorporated in an approved APD are described in Chapter V - Mitigation and Monitoring.

Table 2.1
SUMMARY COMPARISON OF CHEVRON ALTERNATIVES

ALTERNATIVES

ISSUE	1A	1B	2	6A	6B	7A	7B	8	9	12
A. OPPORTUNITY FOR OIL AND GAS EXPLORATION AND PRODUCTION										
Drill Site Access	Road use limited during high water.		Road use limited during winter months.	All weather road use.				Helicopter operations limited by weather.		No change, provides no access to the lease.
Exploration Costs	Costs are essentially the same for all the roaded alternatives, approximately $9,875,000.							Project costs are essentially the same for both helicopter alternatives, approximately 60% higher than the roaded alternatives.		No cost, provides no opportunity to explore the lease.
B. WATER RESOURCES										
Surface Water	Stream sedimentation due to construction of roads and a drill pad would be very low because the percentage of any watershed that would be disturbed is small, whereas undisturbed sediment rates are high. Cutbank failures and stream crossings are potentially the largest contributors to sedimentation from road building activities. These effects would be mitigated through location controls and project design.									No change
Ground Water	Drill fluids, well fluids and contaminated water could enter groundwater prior to casing.									No change
Water Use	A 50 gpm groundwater well is the preferred water source. Should groundwater not be available, a similar amount of stream water or trucked water would be used.									No change

Table 2.1 (continued)

ISSUE	1A	1B	2	6A	6B	7A	7B	8	9	12

C. AIR QUALITY

ISSUE	1A	1B	2	6A	6B	7A	7B	8	9	12
Dust and Emmissions	Dust and emissions on roads and at the drillsite would be highest during construction and drilling with the possibility of particulates accumulating in stream valleys near roads. Neither federal or state air quality standards would be exceeded during normal operations.							Dust and emissions would occur primarily at staging areas and the drillsite.		No change
Hazardous Gases	An accidental release of a hazardous gas during drilling could directly affect air quality in the vicinity of the drillsite until the gas is dispersed to acceptable levels.									No change

D. ACCESS MANAGEMENT AND RECLAMATION

ISSUE	1A	1B	2	6A	6B	7A	7B	8	9	12
Road Reconstruction	1.5 miles of Road 8958	No road reconstruction	5.2 miles of BIA Road 141	1.5 miles of Road 8958	No road reconstruction	1.5 miles of road	No road reconstruction	No road reconstruction	5.3 miles of Road 9128	No change
Road Construction	17.3 miles of new road	17.6 miles of new road	14.9 miles of new and reconstructed road*	16 miles of new road	17.2 miles of new road	17.1 miles of new road	17.4 miles of new road	1.0 mile of new road	0.1 mile of new road	no change
Trail Encroachment	13 miles of trail would be relocated. At least 1 unavoidable trail crossing.		4.5 miles of trail would be relocated. At least 7 unavoidable trail crossings.	3.5 miles of trail would be relocated. At least 3 unavoidable trail crossings.	3.5 miles of trail would be relocated. At least 1 unavoidable trail crossing.	4.5 miles of trail would be relocated. At least 6 unavoidable trail crossings.		No trail relocation. No trail crossings.		No change

*Includes portion of existing road from Palookaville to Badger Cabin that could be reconstructed.

Table 2.1 (continued)

ISSUE	1A	1B	2	6A	6B	7A	7B	8	9	12

E. GLACIER NATIONAL PARK AND ADJACENT WILDERNESS

ISSUE	1A	1B	2	6A	6B	7A	7B	8	9	12
Air Quality within Glacier National Park	Road construction and drilling traffic may cause dust and emissions where it occurs near Glacier National Park (near Hwy 2). Alternatives 2 and 9 would not contribute to air quality problems in Glacier National Park or adjacent wildernesses.									No change
Wildlife Migration from Glacier National Park to Forest Service and vice versa	Potential effect on Summit migration corridor.	Less potential effect on Summit migration corridor.	No effect on Summit migration corridor, crosses Whiterock Pass sheep migration corridor.	Same as 1A	Same as 1B	Same as 1A	Same as 1B	Same as 1A	No effect on Summit migration corridor.	No change
View from Glacier National Park	Possible road views from high elevations in GNP.		No visual effects	Same as 1A				Possible views of helicopters from GNP.	No visual effects.	No change
Noise - In relation to Glacier National Park	Short-term, daytime noise associated with road construction may be disturbing to GNP users.		No noise effects	Same as 1A				Helicopter and road construction noise would have a significant effect on Park users during the daytime.	No noise effects	No change

Table 2.1 (continued)

ISSUE	1A	1B	2	6A	6B	7A	7B	8	9	12
Noise - in relation to Wilderness	Under certain weather conditions, background drilling and helicopter noise may be evident at high elevations along the wilderness boundary.									No change

F. BADGER-TWO MEDICINE ROADLESS AREA

Roadless Area Character	The effects of all the roaded alternatives in terms of the issues that were identified as values and/or characteristics of the Badger-Two Medicine Roadless Area, are in general, diminished and reduced by the proposal actions. All of these values including the natural appearance of the area, the opportunity for recreational challenges and solitude, the opportunity for primitive recreation would be diminished for the duration of the project. Reclamation effects would be evident for several decades until forest succession progresses.							The helicopter alternatives would be disruptive to those seeking solitude in the area during the operating periods.		No change
Roadless Area Disturbance	8512 ac. would be indirectly disturbed. Represents 8.3% of area.	8320 ac. would be indirectly disturbed. Represents 8.1% of area.	7680 ac. would be indirectly disturbed. Represents 7.5% of area.	8000 ac. would be indirectly disturbed. Represents 7.8% of area.	same as 2	same as 1A	same as 1B	640 ac. would be indirectly disturbed. Helicopter activity introduces the least significant nonconforming use of the roadless area.		No change

G. WILDLIFE (all effects are for yearlong, unmitigated drilling)

Grizzly Bear	May effect because of reduction in available habitat for use, displacement of the bear by drilling and road activities and an increase in mortality risk.									
Grizzly Bear Spring Range	7668 acres impacted, represents 17.1% of range.	7048 acres impacted, represents 15.7% of range.	5569 acres impacted, represents 12.4% of range.	5569 acres impacted, represents 12.4% of range.	5867 acres impacted, represents 13.1% of range.	same as 1A	same as 1B	4094 acres impacted. represents 9.1% of range.	6182 acres impacted, represents 13.8% of range.	No change

Table 2.1 (continued)

ISSUE	1A	1B	2	6A	6B	7A	7B	8	9	12
Grizzly Bear Average Habitat Effectiveness (See Chapter X for definition)	71.19%	71.35%	73.57%	72.1%	71.77%	71.19%	71.35%	75.40%	75.04%	76.47%
Gray Wolf	No effect based on short term displacement of prey base and the absense of an established pack in the area. The short term displacement of the prey base can be fully mitigated by timing restrictions and road and trail closures.									
Bald Eagle/ Peregrine Falcon	No effect due to lack of nesting territory along proposed alternative routes.									
Elk Winter Range	703 acres impacted, represents 2.7% of range.	708 acres impacted, represents 2.8% of range.	708 acres impacted, represents 2.8% of range.	575 acres impacted, represents 2.2% of range.	575 acres impacted, represents 2.2% of range.	536 acres impacted, represents 3.0% of elk range.	664 acres impacted represents 3.6% of range.	424 acres impacted, represents 1.6% of range.	424 acres impacted, represents 1.6% of range.	No change
Elk Calving Displacement	2-5% of the loss in total seasonal range is in calving areas		No calving area disturbed	No calving area disturbed	No calving area disturbed	Same as 1A				No calving area disturbed
Moose Winter Range	7,345 acres impacted, represents 26.5% of range.	7,420 acres impacted, represents 26.8% of range.	3,174 acres impacted, represents 11.4% of range.	5,501 acres impacted, represents 19.8% of range.	6,033 acres impacted, represents 21.8% of range.	Same as 1A	Same as 1B	3,594 acres impacted, represents 12.9% of range.	1,923 acres impacted, represents 6.9% of range.	No change

Table 2.1 (continued)

ISSUE	1A	1B	2	6A	6B	7A	7B	8	9	12
Mountain Goat Seasonal Range	1,214 acres impacted, represents 9.5% of goat seasonal range.		1,892 acres impacted, represents 14.8% of goat seasonal range.	1,214 acres impacted, represents 9.5% of goat seasonal range.		Same as 1A		2,168 acres impacted, represents 16.9% of goat seasonal range.	Same as 8	No change
Mountain Goat Yearlong Habitat	Yearlong goat habitat could be affected between Badger Cabin and the wellsite.		Same as 1A, and two additional areas could be affected.	Same as 1A				Yearlong habitat area that could be affected is in the vicinity of the wellsite.	Same as 8 and also along the flight path in the Mount Baldy-Kiyo Crag area.	No change
Black Bear	Similar to grizzly bear.									No change
Other Wildlife	Displacement of birds and small mammals would occur along road corridors, staging areas and at the wellsite. Nesting of raptors and passerines may be interrupted along roads, at the wellsite, and in staging areas.									No change
Wildlife Migration Routes	Discussed under Section E, Glacier National Park and Adjacent Wilderness									

Table 2.1 (continued)

ISSUE	1A	1B	2	6A	6B	7A	7B	8	9	12
Operating Windows	Operating windows describe activity time frames developed to minimize the impacts on wildlife habitat. Analysis of various levels of wildlife protection and timing constraints on exploratory drilling indicates that no window would be available for drilling if the highest level of wildlife protection is adhered to. Alt. 2 effects the least amount of high quality wildlife habitat for the most species. Various timing options or "windows" are listed below: 9-1/2 Month Window - Allows no activity in goat kidding/nursery period. Allows activity in yearlong and breeding goat habitat, elk/moose winter range, and grizzly denning/spring habitat. 8-1/2 Month Window - Allows no activity in the spring season on grizzly spring range and no activity in the spring elk calving and goat kidding habitat. Allows activity in goat winter and breeding habitat, grizzly denning habitat and small portions of elk and moose winter range. 3 Month Window - Allows no activity on any species' winter and spring habitat (during those seasons). Allows activity during summer months on yearlong goat habitat.									No change
H. FISHERIES										
Fish Habitat	Roaded alternatives would contribute less than a 2% increase in sediment production above natural levels over a 5 year period. Pure strain of native cutthroat trout would not be affected.							No effect		No change
Fishing Pressure	If the roads remain open, the increased road access to the streams in the project area would result in increased fishing pressure and could be very detrimental to fisheries over time.							No effect		No change
I. VEGETATION										
Vegetation Loss	79 ac. includes 13 ac. in riparian areas	80 ac. includes 13 ac. in riparian areas.	68 ac.	73 ac.	78 ac.	77 ac.	79 ac.	14 ac.	10 ac.	No change

Table 2.1 (continued)

ISSUE	1A	1B	2	6A	6B	7A	7B	8	9	12
Noxious weeds	Vehicle traffic, particularly where there is ground disturbance may result in the spread of noxious weeds.							No effect		No change
Sensitive Plants	No identified sensitive plant species are known to occur in the project area.									No change
Grazing	Vegetation loss represents a minimal reduction in available forage for grazing animals and would not effect grazing permits.									No change
J. OUTDOOR RECREATION										
Recreation Opportunity	Roaded alternatives would change 2,200 acres from a "semi-primitive" to a "roaded natural" setting.							Helicopter alternatives would present a minor reduction in the number of "semi-primitive acres setting.		No change
Recreational Uses and Tourism	Exploration sights and sounds may detract from the "naturalness" of the area and adversely affect businesses that are directly related to that type of land character.									No change
Summit Campground	Road construction could create distracting noise at Summit Campground.	No effects		Same as 1A	No effects	Same as 1A	No effects	Some noise due to helicopters	No effects	No change
Continental Divide National Scenic Trail	Alternatives 1A, 6A, and 7A would cross the Continental Divide National Scenic Trail near Marias Pass.							Helicopter flights would be visible from the Continental Divide National Scenic Trail.		No change
Wild and Scenic Rivers	All of the roaded alternatives would involve crossing the North Fork Badger Creek and paralleling the Wild and Scenic River corridor for approximately 2 miles.							No effect		No change

Table 2.1 (continued)

ISSUE	1A	1B	2	6A	6B	7A	7B	8	9	12
Trails	Trails would be crossed under all roaded alternatives (Reference Table 4.2).							No effect		No change
Snowmobiling	All of the roaded alternatives would cross a heavily used snowmobile trail loop (Trails #101 and 103). Alternative 1A, 6A, and 7A would cross a snowmobile play area near Marias Pass.							No effect		No change

K. VISUAL RESOURCES

General Views from Hwy. 2	No effect	Visible construction along Hwy. 2	No effects	No effect	Visible construction along Highway 2	No effect	Visible construction along Highway 2	Same as 1B, with possible views of helicopters in flight	No effects	No change
Views of Two-Medicine Ridge from critical viewpoints (viewpoints C & D)	All potential road views from the two critical viewpoints are expected to be screened by vegetation							Possible views of helicopters in flight.	No views from critical points	No change
Views from Two Medicine-Elk Calf Mt. National Recreation Trail (viewpoints A & B)	Road would run through viewpoint A. Portions of the road between Two Medicine Ridge and Hwy 2 may be seen from viewpoint B.		Not visible from viewpoints A, or B	Same as 1A		4 miles of road starting at Sawmill Flat may be visible from viewpoint B.		Not visible from viewpoint A. Helicopters in flight may be seen from viewpoint B.	Not visible from viewpoint A	No change

Table 2.1 (continued)

ISSUE	1A	1B	2	6A	6B	7A	7B	8	9	12
Views from Autumn Creek Trail (viewpoint F)	Portions of road may be seen from viewpoint F.		Not visible	Potential for 4 miles of road seen from viewpoint F.		Same as 1A		Potential for staging area to be seen from viewpoint F.	Not visible from viewpoint F.	No change

L. CULTURAL VALUES

ISSUE	1A	1B	2	6A	6B	7A	7B	8	9	12
Blackfeet Traditional Culture	Blackfeet Traditionalists believe that traditional cultural values would be adversely affected from the increased potential for noise, physical damage and disruption of ceremonies and ceremonial sites by the implementation of this project. Traditionalists also believe that the area is a last stronghold for pristine conditions and an area where traditional ways can be practiced. For Traditionalists, exploration would disrupt these conditions. Access restrictions may lessen this impact.									No change
Archaeology	No cultural sites identified									No change

M. BLACKFEET RESERVED RIGHTS

ISSUE	1A	1B	2	6A	6B	7A	7B	8	9	12
Hunting/Fishing	No effect as reserved under the Articles of the 1896 agreement.									
Timber	No effect as reserved under the Articles of the 1896 agreement.									
Access	Tribal members would be required to observe restrictions on trails and newly constructed Forest System roads as specified in the Forest Travel Plan.							No effect		No change

Table 2.1 (continued)

ISSUE	1A	1B	2	6A	6B	7A	7B	8	9	12
N. SOCIO-ECONOMICS										
Employment	About 30 full-time workers would be associated directly with drilling. Approximately 10 of these 30 workers may be hired locally.									No change
Employment (cont)	Local expenditures for exploration could be approximately $3.5million. These expenditures could result in $6.1 million in business activity for the regional area (Glacier, Toole, Pondera, Teton, and Cascade counties) and support 120 short-term jobs in construction, transportation, oil/gas services and retail trade. Local expenditures would depend upon the availability of oil and gas support services in the area and actual surface and subsurface conditions encountered while drilling.							Local expenditures for exploration could be approximately $2.6 million. These expenditures could result in $4.4 million in business activity for the regional area and support 75 short-term jobs.		No change
Population	Temporary workers would probably reside in East Glacier Park. This would result in a temporary 1% population increase with a crew camp and up to an 8% population increase without a crew camp.		Temporary workers would reside in East Glacier Park or Browning, resulting in a population increase of 0% to 4%, with or without a crew camp.	Same as 1A					Same as 2	No change

Table 2.1 (continued)

ISSUE	1A	1B	2	6A	6B	7A	7B	8	9	12
Housing	2-30 temporary housing units may be needed in East Glacier Park		2-5 temporary housing units may be needed in East Glacier Park and 2-25 units may be needed in Browning.	Same as 1A					Same as 2	No change
Earnings	There would be less than a one percent increase in earnings for the local area (Glacier and Pondera counties).									No change
Lifestyles	The employment benefits to the lifestyles of the residents in local communities would be small and short term, for the most part. East Glacier Park and Browning would receive the potential jobs for Alternatives 1A, 1B, 6A, 7A, and 7B. Heart Butte, closest to Alternatives 2 and 9 would probably receive little economic benefit because of a lack of services. Alternatives 8 and 9 would provide less economic benefit to communities because fewer workers would be needed. East Glacier Park service businesses such as restaurants, hotel, etc., would have a short-term increase in business under Alternatives 1A, 1B, 6A, 6B, 7A, 7B, and 8. The amount of the increase would be dependent on whether or not a crew camp is used for drilling. Some retail trade increase may be experienced in Browning for all of the Alternatives. No retail sales increase is expected for Heart Butte for Alternatives 2 and 9.									No change

Table 2.1 (continued)

ISSUE	1A	1B	2	6A	6B	7A	7B	8	9	12
Community Values, Beliefs, and Attitudes	Roaded Alternatives 1A, 1B, 6A, 6B, 7A, and 7B are viewed by some local residents as an irreversible/irretrievable destruction of the wild integrity of the RM-1 Unit. Roaded Alternatives 1A, 1B, 6A, 6B, 7A, and 7B are viewed by some as disruptive to the area around Sawmill Flats, a popular hunting and recreation area. Snowmobilers would only be impacted by road closures if drilling proceeded in the winter. Motorcyclists/ATV users would be displaced from trails under Alternative 6A during drilling. They also view the development of roads on existing trails as less challenging to their activity. Water pollution of the South Fork of the Two-Medicine is considered by many to be a potential problem for all Alternatives. Blackfeet traditionalist believe that any of the action alternatives would have a adverse impact on their traditional religious practices. Some residents of Heart Butte feel that implementation of Alternative 2 would benefit them by improving access over Whiterock Pass Road. Others believe that Alternative 2 would be a detriment to their continued use of the area for cultural purposes. Heart Butte residents would be least affected by Alternatives 1A, 1B, 6A, 6B, 7A, and 7B. East Glacier Park residents would be least effected by Alternative 2. Alternatives 8 and 9 are least objectionable to those preferring to see the RM-1 Unit remain roadless. All of the roaded alternatives would be appealing to business people in the local communities that support oil and gas development. Outfitters would be most affected by Alternatives 1A, 1B due to trail displacement. The outfitters also believe that Alternatives 6A, 6B, 7A, and 7B would diminish the backcountry experience for their clientele.									No change

Table 2.1 (continued)

ISSUE	1A	1B	2	6A	6B	7A	7B	8	9	12
Social Organization	Residents of East Glacier Park feel that implementation of any action Alternative could impact the social structure of their community by an influx of new residents, increased income and by increasing the liklihood of conflicts over land use philosophy. Blackfeet tribal members hold several opinions about oil and gas development in the RM-1 Unit. The issue may either serve to unite the people in a common cause or widen the gaps between the existing philosophies.									Alternative 12 (No action) would not be acceptable to local business people who feel oil and gas development is an appropriate multiple use of the National Forest.
O. HEALTH AND SAFETY										
Road Use and Public Safety	Any increase in road traffic could increase potential for vehicle accidents or safety conflicts between pedestrians and vehicles using roadways. Increased winter road use could generate or add to winter driving hazards.							Forest user safety is a concern in the event of an equipment malfunction or helicopter mishap. Recreationists using horses may be concerned that helicopter overflights could cause disruption and possible injury.		No change
Rig Activity and Public Safety	Should a blowout occur, direct effects could include potential harm to animals and humans located in the immediate vicinity of the drillsite from the presence of hydrogen sulfide, and other gases. Portions of Trails 101, 103, and 104 could be closed for up to 10 days in the event of an H_2S event. The amount of trail closed would be dependent on the magnitude of the event, the local weather, and monitoring information.									No change

Table 2.1 (continued)

ISSUE	1A	1B	2	6A	6B	7A	7B	8	9	12
P. UNAVOIDABLE ADVERSE EFFECTS										
Oil & Gas Exploration	All roaded alternatives would impose a temporary change on the landscape during the drilling period. Reclamation would minimize the long-term effect to visual discord. Noise from drilling operations would be evident near roads and the drill site.							There would be apparent noise and emissions from helicopters and drilling equipment.		No change
Water Resources	Some sedimentation from the construction and use of roads is unavoidable. Risk is greater for those roads and portions of roads closer to streams and with more stream crossings. There is also the possibility, however remote, of drill fluid leakage into groundwater and streams.							No road crossings, therefore, no risk of sedimentation. Possibly drill fluid leakage into groundwater and streams		No change
Air Quality	Air quality would be locally affected by dust and emissions. Dust on roads particularly during construction would be unavoidable, even if dust abatement measures are used. Noise from traffic, road construction and drilling would occur and affect others in the immediate vicinity of the operations.									No change
Glacier National Park and Wildernesses	Some views of new/reconstructed road may be unavoidable to Glacier National Park users. Some noise from road construction near the Park boundary would be unavoidable.							Possible helicopter views. Possible noises from helicopters.		No change

Table 2.1 (continued)

ISSUE	1A	1B	2	6A	6B	7A	7B	8	9	12
Badger-Two Medicine Roadless Area	Road and drill pad construction and the traffic, noise, and emissions associated with drilling would be an unavoidable effect of all of the roaded alternatives and would be considered by some to be incompatible with the roadless character of the area. Suitability for wilderness designation would be reduced in areas disturbed by roads and the drilll pad.							Roadless values of the area would be largely protected, except at the drillsite. Some noise from helicopters would be unavoidable.		No change
Wildlife	Some disturbance of year-long mountain goat habitat would be unavoidable for all action alternatives. An increased ease of access may have an unavoidable impact on wildlife through increased hunting pressure (legal and illegal). Displacement of wildlife habitat would be unavoidable for all action alternatives.									No change
Recreation	Impacts to recreation opportunities, resources, and activities would occur for each action alternative for the duration of the exploration activity. Some trail closures (#144, 103, 141, and 142), relocations, and crossings are unavoidable.							The sights and sounds of helicopter traffic may be unavoidable.		No change
Visual Resources	Views of roads and road traffic may be unavoidable for forest users.							Helicopter sightings may be unavoidable		No change
Cultural Values	Physical, auditory and visual disturbances that are unavoidable with the action alternatives would be adverse to the beliefs of Traditionalists Blackfeet.									No change
Socioeconomics	Socioeconomic changes resulting from the implementation of this project would include an increase in population, possible housing shortages and an increase in traffic. These unavoidable effects would alter the present "quality of life" in the area									No change
Health and Safety	The possibility of a well blowout is remote. Industry-wide, there is a .06% chance of a blowout. A blowout would result in implementation of a safety plan. This could include temporary trail closures and other forest use restrictions.									No change

Table 2.1 (continued)

ISSUE	1A	1B	2	6A	6B	7A	7B	8	9	12

Q. ANTICIPATED LONG TERM EFFECTS

Trail Access	Improvement of BIA Road #2 and Forest Service Road #9128 (from the county road to Badger Cabin) would increase use and access to the area.									No change
Glacier National Park and Wildernesses	Long-term effects, except in Alternatives 2 and 9, would include visual impacts from roads (in the lower South Fork of the Two Medicine Valley) constructed until forest succession progresses.							No effect		No change
Badger-Two Medicine Roadless Area	Approximately 7 to 8% of the roadless area would be affected by the proposed drilling activity, actual disturbance area would approximate 61 acres. Vegetative scars would persist for decades from road disturbance until forest succession progresses.							No effect		No change
Wildlife	The major long-term effect could be the decline of the goat population if they experience stress that leads to a reduction in reproduction.							No change		
Fisheries	Effect could be a decline in the fishery if increased access occurs.							No change		
Visual Resources	Similar to short-term/long-term effects for Badger-Two Medicine Roadless area. Long-term effects might occur with some alternatives to the Elk Calf Two-Medicine National Recreation Trail and the Continental Divide National Scenic Trail due to visual impacts.									No change

R. IRREVERSIBLE AND IRRETRIEVABLE EFFECTS

Archaeological Resources	Potential damage to undiscovered cultural resources during construction.									No change
Cultural Values	For Blackfeet Traditionalists, the proposed activity would have an adverse effect in the area for traditional cultural practices.									No change

2. ALTERNATIVES FOR THE FINA PROJECT

The Forest Service and BLM requested that the Hall Creek Environmental Assessment (Fina's original proposal) be returned to the agencies by the Interior Board of Land Appeals in 1985. Because of this action, the decision for Fina's proposal was vacated and there no longer existed a "preferred alternative" (Bureau of Land Management and Forest Service, 1985). The Fina analysis was updated and re-assessed when the Chevron and Fina proposals were combined into this document. The ID Team has reviewed all reasonable alternatives for the Fina proposal. Some of these alternatives identify access routes similar to those identified in the Hall Creek Environmental Assessment. Additional alternatives have been identified.

Twelve preliminary alternatives were identified by either the ID Team or Fina. Five of the alternatives identified in the preliminary review process were eliminated from detailed analysis because they were determined to be technically or administratively unreasonable. These alternatives are discussed in Section A below. The seven remaining alternatives, including the "no action" alternative were analyzed in-depth. These alternatives are described in Section B. Section C indicates which alternative is the preferred choice of the Forest Service and BLM in responding to Fina's application. Section D compares the preferred alternative and the other alternatives in terms of environmental, social, and economic consequences. The information in Table 2.2 is a summary comparison of detailed information presented in Chapter IV.2.

A. FINA ALTERNATIVES ELIMINATED FROM DETAILED STUDY

A summary description of the five alternatives that have been eliminated and the rationale for their elimination are discussed below.

Alternative A1

This route was originally proposed, staked, and surveyed by Fina. This route was identified and proposed because it utilized portions of existing roads. The ID Team that conducted the Hall Creek Environmental Analysis reviewed and dismissed this route because it paralleled the riparian zone along the South Fork of the Two Medicine River, which was identified as having important wildlife values (Bureau of Land Management and Forest Service, 1985). This route was again reviewed in this analysis with similar conclusions. In addition, this route is unfavorable because of engineering problems associated with river crossing approaches and an excessive river span across the South Fork of the Two Medicine River that would be required to allow for periodic natural flooding.

Alternative A

This alternative was identified in the Hall Creek Environmental Assessment as Access Route A. It was eliminated from further study in this document based on information recently gathered from vegetative mapping in the Badger-Two Medicine Bear Management Unit. The segment of the road that begins in the NW1/4 Section 23, T.30N., R.12W. and proceeds to the well site in Section 26, T.30N., R.13W. passes through vegetative units that have high feeding value for the grizzly bear. These high value vegetation units include riparian shrubfields, aspen/lodgepole mosaics, grasslands and grassland/aspen mosaics. In other respects this alternative is similar to *alternative A2*, which is discussed in detail in Chapter IV.2. Because the area encompassed by this segment of road is important spring range for the grizzly bear and because of the need to ensure that the project impacts the least amount of high value vegetation as possible, this alternative was eliminated from further study.

Alternative B

This alternative was identified in the Hall Creek Environmental Assessment as Access Route B. Because the upper portion of this route is identical to that of *alternative A* above, similar reasons were used to eliminate it from further study. In other respects, this alternative is similar to *alternative C2*, which is discussed in detail in Chapter IV.2

Alternative C

This alternative was identified in the Hall Creek Environmental Analysis as Access Route C. Because the upper portion of this route is identical to that of *alternatives A and B* above, it was also eliminated from further study in this analysis. In other respects this alternative is similar to *alternative C2*, which is discussed in detail in Chapter IV.2.

Alternative D - Lower Deep Creek

This route was identified in the Transportation Analysis prepared for the Hall Creek Environmental Assessment (Schaeffer, 1984) as Alternative Route D. It was eliminated from further study in the Hall Creek Environmental Assessment because of right-of-way acquisition needs and impact on riparian habitats. This route also traverses the entire elk winter range in Mettler Coulee, Hyde, Box and Hall Creek drainages as well as key grizzly bear spring range. Because of potential impacts to these key seasonal habitats, in addition to the reasons mentioned in the Hall Creek Environmental Assessment, this alternative was eliminated from further study.

B. FINA ALTERNATIVES CONSIDERED IN DETAIL

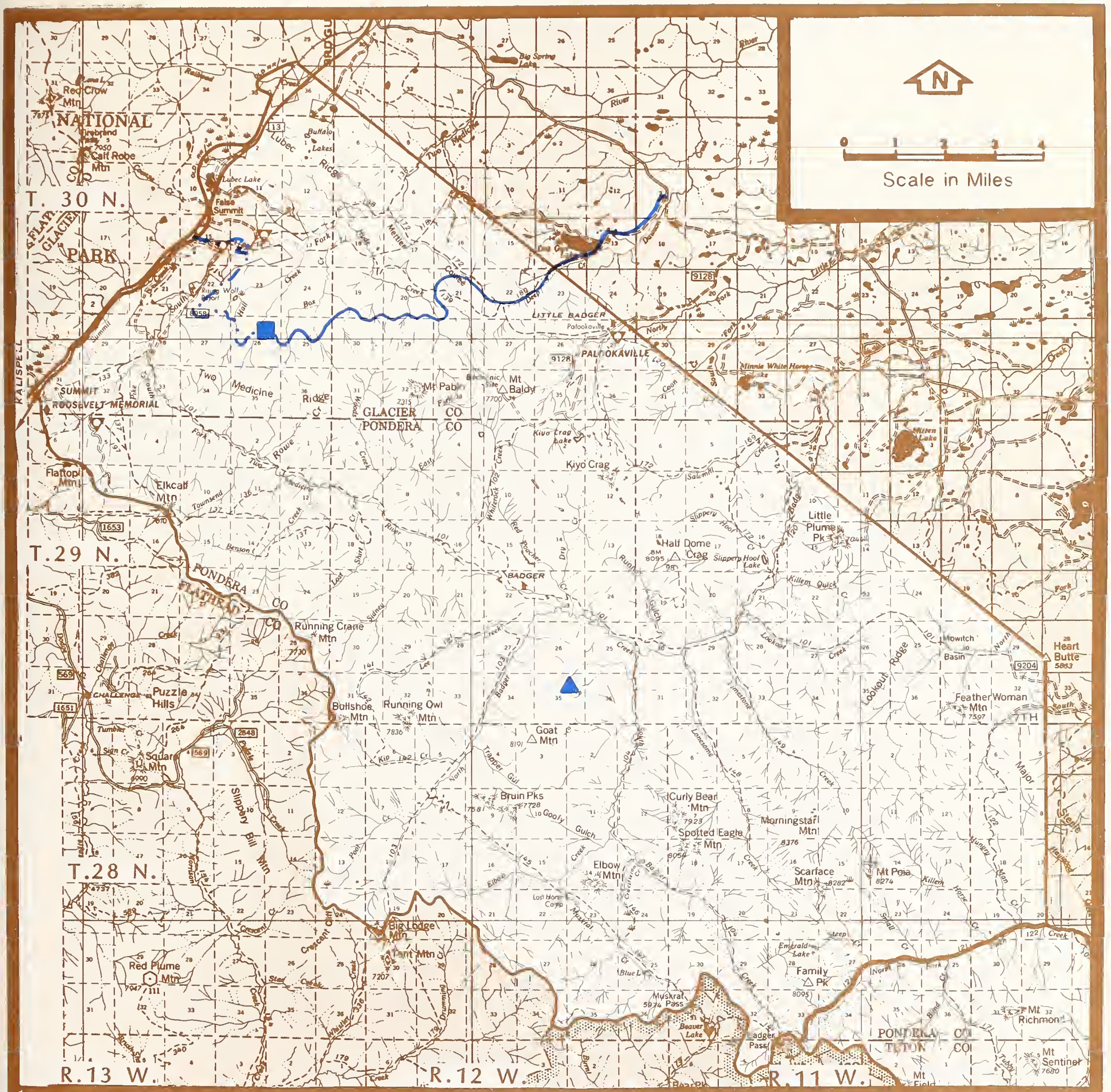
The following alternatives were identified and analyzed in detail: 1) the location and type of initial access to be permitted (access alternatives); and 2) post drilling, or post operation reclamation. Reclamation considers the final reshaping and revegetating of the disturbed areas. It also considers post-drilling road use and long-term access management for the project area. Alternative mitigation is discussed in Chapter V.

Alternatives

Seven alternatives were subjected to a detailed analysis. Several of these alternatives have been analyzed previously in the Hall Creek Environmental Assessment (Bureau of Land Management and Forest Service, 1985). In the identification of the Fina alternatives, consideration was made of the identified issues and concerns, the economic and technical limitations of the industry, and the standards and direction contained in the Lewis and Clark National Forest Plan (Forest Service, 1986a). This direction is included in Appendix C. Several of the Fina access alternatives utilize access corridors and staging areas identified for the Chevron alternatives. These alternative interrelationships are described in Section II. 3. below.

Alternative A2 - False Summit

Road access would be from US Highway 2 in the NW1/4 of Section 15, T30N, R13W (Map 2.5). Access would proceed through Sections 14, 15,and 23, then join an existing jeep trail in Section 22 and continue to the well site. This alternative was originally identified by Fina and considered in detail in the Hall Creek Environmental Assessment as *alternative 5* (Bureau of Land Management and Forest Service, 1985, pages 54 and 55).



LEGEND

-·-·- Alternative A2

■ Fina Well Site Location

—— Alternative D1

▲ Chevron Well Site Location

MAP 2.5

FINA ALTERNATIVE ROAD LOCATIONS A2 AND D1

Alternative B2 - Sec. 28 and 29

Road access to the Fina well site would be from US Highway 2, beginning at the present Forest Service trailhead in the NE1/4 NW1/4 of Section 29, T.30N., R.13W. and extending through Sections 28 and 29, T.30N., R.13W., joining an existing jeep trail, then continuing to the well site (Map 2.6). This alternative was considered in detail in the Hall Creek Environmental Assessment as *alternative 6* (pages 55, 56). It was identified by the ID Team in order to avoid oil and gas activity near the Summit Campground-Marias Pass area, similar to Chevron *alternatives 6B and 7B.*

Alternative C2 - Pike Creek Road

Road access to the Fina well site would enter from US Highway 2 via the Pike Creek Road in Section 28, T.30N., R.13W. and approach the location from the southwest (Map 2.6). This alternative was considered in detail in the Hall Creek Environmental Analysis as *alternative 7* (page 56). It was identified by the ID Team because it utilized existing road and stayed primarily in timbered areas. This alternative received a non-jeopardy opinion from the US Fish and Wildlife Service and was the preferred alternative in the original Hall Creek Environmental Analysis (Forest Service and BLM, 1985, Appendix C3).

Alternative D1 - Deep Creek

Road access to the Fina well site would be from Deep Creek along the route of Forest Service Trail 180 and continue through Sections 19, 20, 21 and 24 to the well site (Map 2.5). This alternative was not considered in the Hall Creek Environmental Assessment. It was identified by the ID Team to avoid exploration activity near Glacier National Park. No bridge construction would be required.

Alternative F8 - Helicopter Mobilization from Lower South Fork of Two Medicine

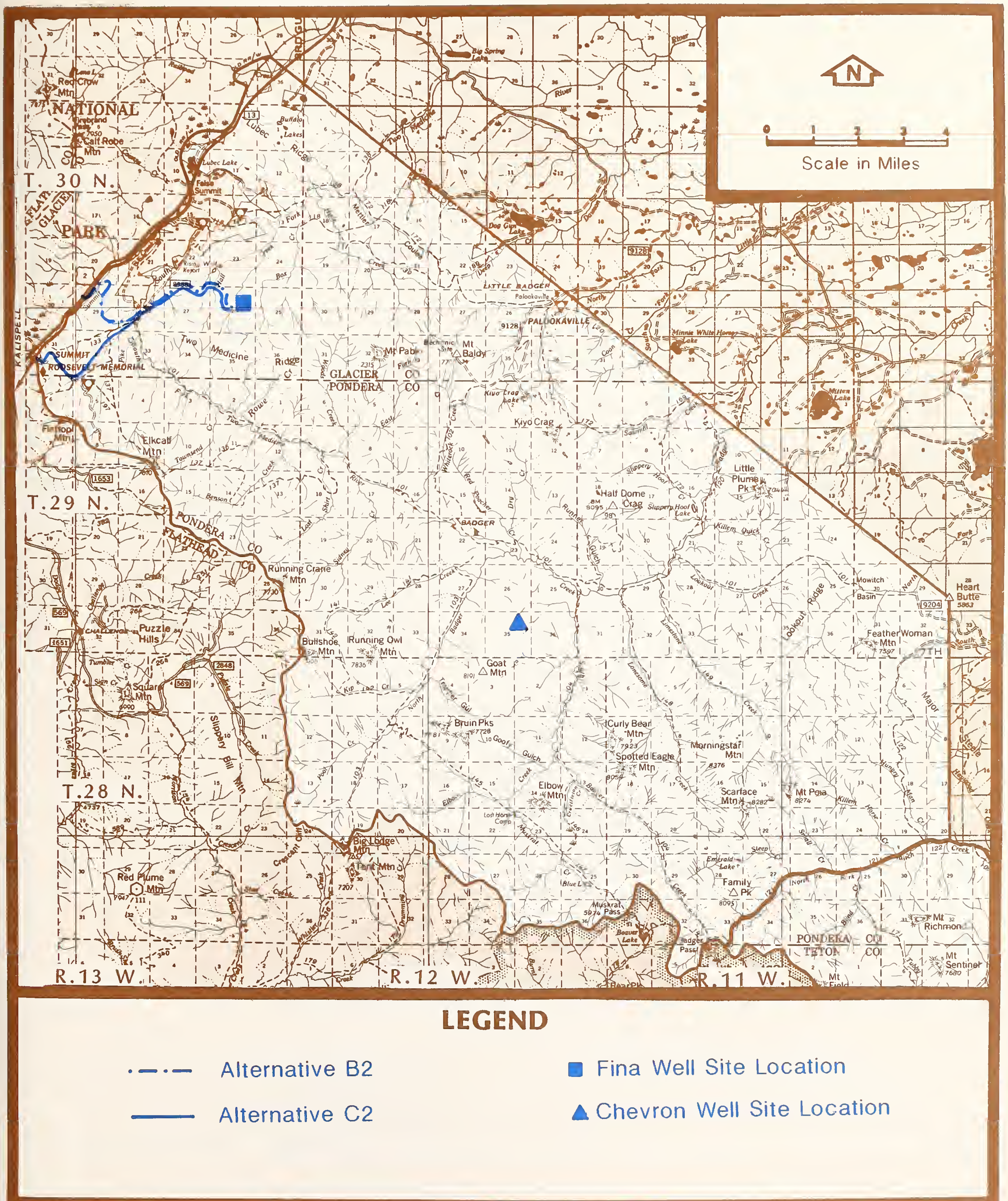
Access to the well site would be via helicopter from the lower South Fork of the Two Medicine and would approach the well site from the west. The helicopter staging area would require approximately one mile of road construction from US Highway 2 to the approximate center of Section 29, T.30N., R.13W. (Map 2.7). This alternative was identified for the same reasons as Chevron *alternative 8* (see Section II.B.) and utilizes the same staging area. More detailed information on helicopter activity related to drilling is found in Appendix N.

This alternative does not address development aspects of Fina's proposal. Should an application be made to produce from the well, other access routes identified, such as *alternatives A2, B2, C2, and D1* would need to be considered because of the need for road access to facilitate production.

Alternative F9 - Helicopter Mobilization from Palookaville

Access to the well site would be via helicopter from the vicinity of Palookaville and would approach the well site from the east. The helicopter staging area would be adjacent to Forest Service Road 9128 at the NE1/4 of Section 25, T.30N., R.12W. (Map 2.7). This alternative was identified for the same reasons as Chevron *alternative 9* and utilizes the same staging area. Detailed information on helicopter activity related to drilling is found in Appendix N.

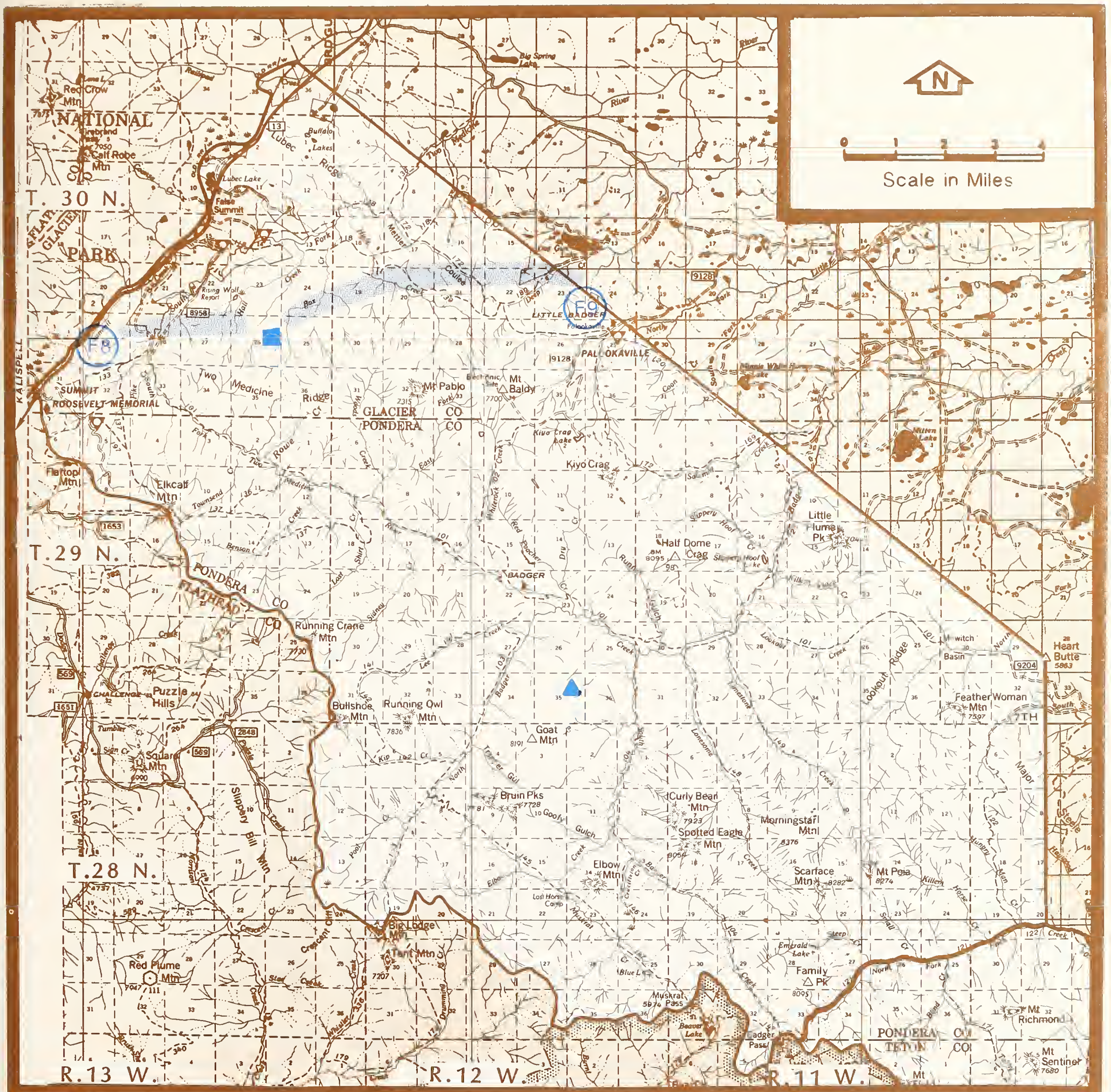
This alternative does not address development aspects of Fina's proposal. Should an application be made to produce from the well, other access routes identified, such as *alternative A2, B2, C2, and D1* would need to be considered because of the need for road access to facilitate production.



LEGEND

—·—·— Alternative B2	■ Fina Well Site Location
——— Alternative C2	▲ Chevron Well Site Location

MAP 2.6 FINA ALTERNATIVE ROAD LOCATIONS B2 AND C2



LEGEND

- (F8) Alternative F8 Staging Area
- (F9) Alternative F9 Staging Area
- ▨ Helicopter Flight Path
- ■ Fina Well Site Location
- ▲ Chevron Well Site Location

MAP 2.7 FINA ALTERNATIVES F8 AND F9

Alternative E - APD Not Approved

Under this alternative, Fina's APD would be denied. Adoption of this alternative would result in a continuation of current management direction and practices. Previously issued leases would remain in effect. Future APDs may still be submitted by Fina and other leaseholders in the area. Denial of Fina's APD would not automatically result in denial of future applications for exploration and development, and it would not change the status of the Chevron project.

Post Drilling Reclamation

The reclamation strategy proposed for the Fina project is the same as that discussed in Section II.B for the Chevron project. Refer to Appendix K for reclamation strategies specific to each access alternative analyzed in detail.

C. IDENTIFICATION OF THE PREFERRED FINA ALTERNATIVE

Alternative A2 is the Forest Service and BLM preferred alternative. The preferred alternative may be revised or modified in the Final EIS based on comments received on the Draft EIS and site specific investigations conducted for the preferred corridor. Site specific investigations would include road and well site location (staking) and design, cultural resource clearance, botanical surveys, and identification of appropriate mitigation measures.

D. SUMMARY COMPARISON OF FINA ALTERNATIVES

Table 2.2 summarizes the information from Chapter IV.2 and compares the various alternatives in terms of physical, biological, social and economic effects. Only those alternatives analyzed in detail in Chapter IV.2 are included in Table 2.2. The discussion in the table is organized to address the issues and concerns as they appear in Section I.C. Fifteen issues, designated by capital letters A through O, are used to describe the effects to the physical, biological, social, and economic environment. These effects are also described by alternative for the alternatives analyzed in detail. The effects are listed as unmitigated, and mitigated where applicable. Residual unmitigated effects are listed separately in Table 2.2 under the following headings: P. Unavoidable Adverse Effects; Q. Anticipated Long-Term Effects; and R. Irreversible and Irretrievable Effects. These are also discussed in more detail in Chapter IV.2.

These effects and mitigation measures are discussed in detail in Chapter IV.2. Additional mitigation measures that may be incorporated in an approved APD are described in Chapter V. - Mitigation and Monitoring.

Table 2.2
SUMMARY COMPARISON OF FINA ALTERNATIVES

ISSUE	A2	B2	C2	D1	F8	F9	E
A. OPPORTUNITY FOR OIL AND GAS EXPLORATION AND PRODUCTION							
Drill Site Access	These roads would be similar in length and cost to construct. These alternatives would allow the resources to be explored at a minimum cost to company.			Distance increases from an all weather highway.	Helicopter operations limited by weather.		No change, no lease access.
Exploration Costs	Development costs are approximately $5,600,000			Development costs would be slightly higher than A2.	Development costs would be approximately 2.5 times higher than the road alternatives.		No cost, but no opportunity to explore lease.
B. WATER RESOURCES							
Surface Water	The area has a high, natural sedimentation rate, stream sedimentation due to road and drill pad construction would be low due as only one access road would traverse the watersheds.						No change
Road Sediment Yields - First 5 years	1.3 tons/year	3.1 tons/year	1.9 tons/year	3.1 tons/year	negligible sediment yield		No change
Ground Water	Drilling fluids, well fluids, and contaminated water from drilling could enter ground water prior to casing.						No change
Water Use	A 50 gpm water well is the preferred water source for drilling. Surface water is the 2nd choice for drilling water, using either stream or trucked water.						No change

Table 2.2 (continued)

C. AIR QUALITY

ISSUE	A2	B2	C2	D1	F8	F9	E
Dust and Emissions	Dust and emissions on roads or at drillsite would be highest during drilling. Federal and state air quality standards are not expected to be exceeded under normal operations.				Dust and emissions would occur at staging areas and drillsite.		No change
Hazardous Gases	Accidental release of hazardous gases could directly affect the air quality in the vicinity of the wellsite and downwind of the wellsite.						No change

D. ACCESS MANAGEMENT AND RECLAMATION

ISSUE	A2	B2	C2	D1	F8	F9	E
Access Management	Roads would provide new access into previously unroaded areas. Drilling traffic would have little effect on state and reservation transportation systems.					No new roads	No change
Road Reconstruction	Would access some private lands currently without vehicle access. Approximately 0.3 miles of road reconstruction (Forest Road No. 9223).	No road reconstruction.	1.5 miles of road reconstruction (Pike Creek Rd. No. 8958).	3 miles of road reconstruction (BIA Rd. No. 2).	No road reconstruction.	Approximately 4 miles of road reconstruction (Rd. No. 9128).	No change
Road Construction	6 miles of new road	6 miles of new road	5 miles of new road	8 miles of new road	1.75 miles of new road	No new road	No change

Table 2.2 (continued)

ISSUE	A2	B2	C2	D1	F8	F9	E
Road Reclamation	1.5 miles of road between US Hwy 2 and the S. Fork Two-Medicine River would be maintained for administrative and permitted use. The remaining 4 miles of road to the wellsite would be reclaimed. The bridge would be removed if a dry hole.	All road constructed would be reclaimed	1.5 miles of reconstructed road (Pike Cr. Rd No. 8958) would be maintained for roaded access. The remaining 5 miles to the wellsite would be reclaimed.	3 miles of BIA Rd. 2 would be maintained for roaded access. The remaining 8 miles to the wellsite would be reclaimed.	1.75 miles of new road to the staging area would be reclaimed.	4 miles of reconstructed road (Rd. 9128) would be maintained for public access.	No change
Drillsite	All disturbance at the drillsite and the staging areas would be reclaimed.						No change
Trail Encroachment	1 mile of 4wd trail #101 would be reconstructed. Possibly 1 trail crossing (#118).	1 mile of trail #133 relocated to avoid 2 trail crossings. 1 mile of 4wd trail would be reconstructed. 1 unavoidable trail crossing.	1 mile of 4wd trail would be reconstructed. 3 unavoidable trail crossings.	Possibly 1 mile of 4wd trail #180 relocated. 1 possible trail crossing. 3 unavoidable trail crossings.	2 4wd trails in flight corridor	No effect	No change

Table 2.2 (continued)

ISSUE	A2	B2	C2	D1	F8	F9	E
E. GLACIER NATIONAL PARK ADJACENT WILDERNESS							
Air Quality within Glacier National Park	The proposed project is not expected to affect air quality or visibility in Glacier National Park or the adjacent Wilderness areas. Dust and emissions would occur along roadways and/or staging areas, and at the drillsite during construction and drilling.		Same as A2			No effect	No change
Wildlife Migration from Glacier National Park to Forest Service and vice versa	Little effect on Summit migration corridor	Least effect on Summit Migration Corridor	Greatest effect on Summit Migration Corridor	No effect on wildlife migration corridors		Could have greatest impact on wildlife due to helicopter noise (Same as Chevron 8)	No effect on wildlife migration corridors
Views from Glacier National Park	Road and drill rig lights could be seen from Glacier National Park. Possible road views from Autumn Cr. - Continental Divide Trail. Low potential for views of the project area from wilderness areas.			No visual effect	Potential for helicopter sightings from Glacier National Park		No change
Noise in relation to Glacier National Park	Short-term daytime noise to park users from road construction and drill rig operations.			No additional noise effect	Most significant short term noise effect due to helicopters and construction.		No change
Noise in relation to Wilderness	Noise heard by wilderness users would probably be at background intensity levels along only the higher elevations.						No change
F. BADGER-TWO MEDICINE ROADLESS AREA							
Roadless Area Disturbance	No effect because all the alternatives are located outside the roadless area.						No change

Table 2.2 (continued)

G. WILDLIFE (all effects are for yearlong, unmitigated drilling)

ISSUE	A2	B2	C2	D1	F8	F9	E
Grizzly bear	May effect because of reduction in area available for use, displacement of the bear by drilling and road activities and an increase in mortality risk.						
Gray Wolf	No effect based on short term displacement of prey base and the absence of an established pack in the area. The short term displacement of the prey base can be fully mitigated by timing restrictions and road trail closures.						
Peregrine Falcon	No effect due to a lack of nesting territory along the alternative routes						
Elk Displacement	Elk would be affected most by road construction and use. Increased hunting pressure and migration route disturbances may also occur without road restrictions. Displacement along roads would primarily affect calving and winter range. Alternatives A2, B2, and C2 would be of least impact on elk.				Noise associated with helicopters may have the most significant effect on elk habitat, primarily calving and winter range. No potential for increased harvest.		No change
Elk Winter Range	1996 acres impacted, represents 7.8% of seasonal range.	2816 acres impacted, represents 10.9% of seasonal range.	1646 acres impacted, represents 6.4% of seasonal range.	4576 acres impacted, represents 17.8% of seasonal range.	3580 acres impacted, represents 14.9% of seasonal range.	3580 acres impacted, represents 14.9% of seasonal range.	No change
Grizzly Bear Spring Range	3416 acres impacted, represents 7.6% of range.	3546 acres impacted, represents 7.9% of range.	4216 acres impacted, represents 9.4% of range.	6386 acres impacted, represents 14.2% of range.	6406 acres impacted, represents 14.2% of range.	7007 acres impacted, represents 15.6% of range.	No change
Grizzly Bear Average Habitat Effectiveness (See Chapter X for definition)	74.74%	74.43%	74.26%	74.20%	75.48%	75.13%	76.47%
Elk Calving Displacement	3316 acres impacted, represents 18.6 % of seasonal range.	3416 acres impacted, represents 19.2% of seasonal range.	2736 acres impacted, represents 15.3% of seasonal range.	4286 acres impacted, represents 24% of seasonal range.	5120 acres impacted, represents 28.7% of seasonal range.	4370 acres impacted, represents 24.5% of seasonal range.	No change

Table 2.2 (continued)

ISSUE	A2	B2	C2	D1	F8	F9	E
Moose Winter Range	3386 acres impacted, represents 12.2% of seasonal range.	3116 acres impacted, represents 11.2% of seasonal range.	3183 acres impacted, represents 11.5% of seasonal range.	3453 acres impacted, represents 12.4% of seasonal range.	5570 acres impacted, represents 20% of seasonal range.	4050 acres impacted, represents 14.6% of seasonal range.	No change
Black Bear	Similar to grizzly bear						
Other Wildlife	Some displacement of birds and small mammals along roads. Nesting of raptors and passerines may be interrupted along roads and in helicopter staging areas.						No change
Wildlife Migration Routes	Discussed under Section E, Glacier National Park and Adjacent Wilderness.						No change
Operating Windows	Operating windows describe time frames developed to minimize the impacts on wildlife habitat. Analysis of various levels of wildlife protection and timing constraints on exploratory drilling indicates a 5 month window (July 1 - October 15) would be available for drilling if the highest level of RMF guidelines were adhered to. Of all the alternatives, A2 would generally impact the least amount of wildlife habitat. 5 month window - allows activity on elk/moose summer range - no activity on elk calving, grizzly bear spring range, elk and moose winter range. 9 month window - allows activity on elk and moose summer and winter ranges, but no activity during elk calving season, and grizzly bear spring range. 12 month window - activity on same as 9 month except it affects elk calving and grizzly bear spring range.						No change

Table 2.2 (continued)

ISSUE	A2	B2	C2	D1	F8	F9	E
H. FISHERIES							
Fish Habitat	Roaded alternatives would contribute less than a 2% increase in sediment delivery to the South Fork - Two Medicine and its tributaries. This increase should not affect the fish population.				Little or no increase in sediment delivery to streams		No change
Fishing pressure	If roads remain open, increased access could be very detrimental to fisheries of the South Fork of the Two-Medicine River over time.			No effect			No change
I. VEGETATION							
Vegetation Loss	Between 25 to 38 acres of vegetation would be removed due to clearing for roads and drillsite.				3 - 7 acres of vegetation removal due to clearing for helicopter staging areas and drillsite.		No change
Noxious Weeds	Vehicle traffic, particularly where there is ground disturbance, may result in the spread of noxious weeds.				Very low potential for the spread of noxious weeds.		No change
Sensitive Plants	No plants listed as rare or endangered are known to occur in the project area.						No change
Grazing	Minimal reduction in available forage for livestock.						No change

Table 2.2 (continued)

J. OUTDOOR RECREATION

ISSUE	A2	B2	C2	D1	F8	F9	E
Recreation Opportunity	None of the action alternatives would alter the existing roaded natural setting, although the sights and sounds of exploration would detract from the natural setting sought by some recreationists.						No change
Recreational Uses	Some big game hunters may be displaced by the new road and associated increased access while others would consider the road as advantageous.	Recreationists may be affected by the road in the vicinity of Sawmill Flats and Trail #133.	Most disruptive alternative for recreationists due to location near Summit Campground.	Similar to A2	Least impact to recreationists due to localization of activity in staging areas. Location near Sawmill Flats may displace hunter camps.		No change
Snowmobiling	Alternatives B2 and C2 would cross heavily used snowmobile trail loop (Trail #133).				No effect		No change
Continental Divide National Scenic Trail	Alternative C2 would cross the Continental Divide National Scenic Trail near Marias Pass.				Helicopter flights would be noticeable from the Continental Divide National Scenic Trail		No change
Trails	Trails would be crossed under roaded alternatives with the exception of alternative B2.				Helicopter flights would be noticeable from some trails.		No change

Table 2.2 (continued)

ISSUE	A2	B2	C2	D1	F8	F9	E
K. VISUAL RESOURCES							
General Views from Hwy. 2	Minimum road views from Hwy 2	Most visual disturbance due to new construction near Hwy 2. Views of the area from Hwy 2.	Some view from Hwy 2 of the upper portions of the proposed road.	Portions of this road on the NE side of Two Medicine Ridge may be seen from Hwy 2	Potential for sightings of helicopters in flight and landing from Hwy 2.	Not visible from Hwy 2	No change
Views of Two-Medicine Ridge from critical viewpoints (C & D)	Approximately 2 miles of road south of the Two Medicine River may be seen.	No views from C or D	No views from C or D	Portions of the road would be seen where ridges are devoid of trees.	No views from C or D		No change
Views from Elk Calf National Recreation Trail (viewpoints A & B)	Portions of road would be visible from B.	Potential views from A due to road location near Sawmill Flat. Portions of road would be visible from B.		Would not be visible from A or B.	Potential views of staging area and helicopters in flight from A.	Would not be visible from A or B.	No change
Views from Autumn Creek Trail (viewpoint F)	Portions of road could be visible from F.			Portions of road would be seen where vegetative cover is sparse.	Staging area could be visible. Probable views of helicopters in flight.	Staging area would not be visible . Potential views of helicopters in flight.	No change

Table 2.2 (continued)

ISSUE	A2	B2	C2	D1	F8	F9	E
L. CULTURAL VALUES							
Blackfeet Traditional Culture	Effects on traditional Blackfeet cultural and religious practices would be from the increased potential for noise and disruption of ceremonies, damage to ceremonial sites, and an overall change in the peaceful, pristine conditions of the area.						No change
Archaeological Resources	Site significance would need to be determined.	No cultural sites identified.					No change
M. BLACKFEET RESERVED RIGHTS							
Hunting, Fishing, and Timber Rights	No effect as reserved under the articles of the 1896 agreement						No change
Access Rights	Members of the Blackfeet Tribe would be required to observe restrictions on trails and newly constructed FS system roads as specified in the Forest Travel Plan.				No effect		No change
N. SOCIOECONOMICS							
Employment	Approximately 30 workers (10 local and 20 nonlocal) would be required for the drilling operations. Local expenditures for exploration could be approximately $1.6 to $1.7 million. These expenditures could result in $2.7 to $2.8 million in business activity for the regional area (Glacier, Toole, Pondera, Teton and Cascade Counties) and support 40 short-term jobs in construction, transportation, oil/gas services and retail trade. Local expenditures would depend upon the availability of oil and gas support services in the area and actual surface and subsurface conditions encountered while drilling.						No change

Table 2.2 (continued)

ISSUE	A2	B2	C2	D1	F8	F9	E
N. SOCIOECONOMICS (Continued)							
Population	Temporary workers would probably reside in East Glacier Park. This would result in a temporary 1% population increase with a crew camp and up to an 8% population increase without a crew camp.			Temporary workers would reside in East Glacier Park or Browning, resulting in a population increase of 0% to 4%, with or without a crew camp.	Same as A2, B2, C2	Same as D1	No change
Earnings	There would be less than a 1% increase in personal earnings for the local area (Glacier and Pondera Counties)						No change
Housing	2 - 30 temporary housing units may be needed in East Glacier Park.			2 - 5 temporary housing units may be needed in East Glacier Park and 2 - 25 units may be needed in Browning.	Same as A2, B2, C2	Same as D1	No change
Attitudes, Beliefs, and Values	The cohesion and stability of the communities of East Glacier Park, Browning and Heart Butte could be fragmented by differences in land use philosophies, attitudes, beliefs, values. These differences may become more apparent as development pressure increases.						No change

Table 2.2 (continued)

ISSUE	A2	B2	C2	D1	F8	F9	E
N. SOCIOECONOMICS (Continued)							
Lifestyles	The short term population and employment increase related to exploration drilling would not significantly affect the unemployment situation in Heart Butte or Browning.			Very little economic effect to any of the communities	Same as A2	Same as D1	No change
Social Organization	Individuals who use the RM-1 Unit may find some areas impacted by roads, traffic, and noise. Cut Bank would probably receive most of the business associated with the technical aspects of oil and gas drilling. Short term business benefits would occur in support services and retail businesses, primarily in Cut Bank, Browning, and East Glacier Park. Heart Butte would receive very little employment or business impact.						No change
O. HEALTH AND SAFETY							
Road Use and Public Safety	Any increase in traffic would increase the potential for vehicle accidents. Some Forest road closures would occur to prevent public travel conflicts with drilling activity.				Recreation hazards from spooked pack animals may exist. Helicopter accidents are possible but unlikely. A helicopter-only transportation system for personnel and equipment may cause safety problems if an emergency evacuation is needed in poor weather conditions.		No change
Rig Activity and Public Safety	Should a blowout occur, direct effects could include potential harm to animals and humans located in the immediate vicinity of the drillsite from the presence of hydrogen sulfide, and other gases. Portions of trails near the well site could be closed for a period of approximately 1/2 to 10 1/2 days in the event of an H_2S event. The amount of trail closed would be dependent on the magnitude of the event, the local weather, and monitoring information.						No change

Table 2.2 (continued)

ISSUE	A2	B2	C2	D1	F8	F9	E
P. UNAVOIDABLE ADVERSE EFFECTS							
Oil and Gas Exploration	All roaded alternatives would impose a temporary change in the landscape during the drilling period. Reclamation would minimize the long-term effect to visual discord. Noise from drilling operations would be evident near roads and the drill site.				Noise and emissions from helicopters and drilling equipment		No change
Water Resources	Some sedimentation is unavoidable during road building and at stream crossings.				No effect		No change
Air Quality	Some level of dust and emissions can be anticipated from the proposed activity.						No change
Glacier National Park and Wilderness-Views	Some views of roads and the drill rig.				Some views of drill rig. Some helicopter sightings.		No change
Glacier National Park and Wilderness-Noise	Background level noise during drilling may be heard by wilderness users.						No change
Wildlife	Displacement of elk, moose, deer along roadways and at drillsite would result in an unavoidable loss of habitat. Increased ease of access may unavoidably increase hunting (legal and illegal)						No change
Recreation	Impacts to recreation opportunities, resources, and activities would occur for each action alternative for the duration of the exploration activity. Some trail closures (#118, 139, 140, and 181), displacements, and crossings are unavoidable.						No change
Visual Resources	Sightings of roads and exploration vehicles may be unavoidable for forest users.						No change
Cultural Values	Physical, visual and auditory disturbances that are unavoidable with the action alternatives would be adverse to the beliefs of the Blackfeet Traditionalists.						No change
Socioeconomics	Socioeconomic changes resulting from the implementation of this project would include an increase in population, possible housing shortages and an increase in traffic. These unavoidable effects would alter the present "quality of life" in the area.						No change
Health and Safety	Possibility of a well blowout is remote (<.06% industrywide). A blowout would result in implementation of a safety plan that could include temporary trail closures or other Forest use restrictions.						No change

Table 2.2 (continued)

ISSUE	A2	B2	C2	D1	F8	F9	E

Q. ANTICIPATED LONG TERM EFFECTS

ISSUE	A2	B2	C2	D1	F8	F9	E
Glacier National Park and Wildernesses	Long-term effects would include visual impacts from roads (in lower South Fork of the Two Medicine Valley) constructed until forest succession progresses.				No long-term effects.		No change
Fisheries	Long-term effect could be the decline in the fisheries if increased access occurs.				No change		No change
Visual Resources	Long-term effects would include visual impacts from roads until forest succession progresses. These vegetative scars would persist for decades.				No long-term effects.		No change

R. IRREVERSIBLE AND IRRETRIEVABLE EFFECTS

ISSUE	A2	B2	C2	D1	F8	F9	E
Archaeological Resources	Potential damage to undiscovered cultural resources during construction.						No change
Cultural Values	For Blackfeet traditionalists, the proposed activity would have an adverse effect in the area for traditional cultural practices.						No change

3. CHEVRON/FINA ALTERNATIVE COMBINATIONS

During the scoping process the Forest Service and BLM expressed an intent to analyze the combined effects that could occur should both the Chevron and Fina projects be approved for drilling. The alternative combinations that could result from implementation of both projects are introduced in this section and the effects of simultaneous or sequential drilling are summarized.

There are 70 possible combinations that result from combining the 10 Chevron alternatives and the 7 Fina alternatives (Table 2.3). Of the 70 combinations, 22 combinations were dropped from detailed analysis for reasons listed in Table 2.4. Another 15 combinations would consist of an action alternative for one project, in combination with a "no action" alternative from the other project. The effects generated from these 15 combinations are the same as those described for the Chevron project in Section IV.1. and for the Fina project described in Section IV.2., and are not reiterated further in this section.

The remaining 33 combinations were analyzed for combined effects. Table 2.3 shows how the various alternative combinations paired in the combined analysis.

Table 2.3
Display of Chevron and Fina Alternative Combinations

Chevron	Fina Alternatives						
Alternatives	A2	B2	C2	D1	F8	F9	E
1A	(1)	(1)			(1)	(1)	(2)
1B	(1)		(1)		(1)	(1)	(2)
2							(2)
6A		(1)			(1)	(1)	(2)
6B			(1)		(1)	(1)	(2)
7A	(1)	(1)			(1)	(1)	(2)
7B	(1)		(1)		(1)	(1)	(2)
8							(2)
9							(2)
12	(2)	(2)	(2)	(2)	(2)	(2)	(3)

(1) Combinations dropped from detailed study for reasons discussed in Table 2.4 below.

(2) Combinations dropped from detailed study because no combined effects would occur due to a "no action" alternative in each combination. A complete discussion of effects is included in Section IV.1. for the Chevron project, and in Section IV.2. for the Fina project.

(3) This is a "no action" alternative for both projects. There would be no change from present conditions now occurring in the area.

Table 2.4
Alternative Combinations Dropped from Detailed Study

Combinations	Reasons for Dropping from Detailed Analysis
1A - A2 1B - A2 7A - A2 7B - A2	Combinations eliminated to avoid excessive road construction and adverse effects on the river system from construction of two separate bridge crossings of the South Fork Two Medicine River within approximately 2 miles of each other. Elimination would also eliminate highway safety risk of having two roads access U.S. Highway 2, approximately 2-1/2 miles apart.
1A - B2 1B - C2 71 - B2 7B - C2	Combination was dropped to avoid project traffic from two roads, approximately 2-1/2 miles apart, would have project traffic entering and leaving U.S. Highway 2. The roads would merge at approximately three-quarters of a mile before the South Fork Two Medicine River crossing.
1A - F8 1B - F8 7A - F8 7B - F8	The bridge over the South Fork Two Medicine River would provide access to the Fina drilling site, with approximately two additional miles of road from the Chevron alternatives. There were no environmental effects identified in Sections IV.1. or IV.2. that would indicate the need for helicopter access to the Fina site when road access was allowed to the Chevron site.
1A - F9 1B - F9 7A - F9 7B - F9	The river crossing, and possible access to the Fina site, would be similar to combination 1A - F8. No environmental effects in Sections IV.1. or IV.2. were identified that would indicate a need for helicopter access to the Fina site when road access was allowed to the Chevron site.
6A - B2	Combination was dropped because there is no environmental or other advantage to construct the new access for B2, when the two roads would be within 0.8 mile of merging before the South Fork Two Medicine River crossing. This combination would require two roads from U.S. Highway 2 within approximately two and one-half miles.
6A - F8 6A - F9 6B - F8 6B - F9	No environmental advantage was identified in Sections IV.1. or IV.2. that would indicate a need for helicopter access to the Fina site when road access would be allowed to the Chevron site.
6B - C2	Combination was dropped because there is no environmental or other advantage to construct the new access for 6B, when the two roads would be within 0.8 mile of merging before the South Fork Two Medicine River crossing. Two roads, approximately two and one-half miles apart, would have project traffic entering and leaving U.S. Highway 2.

The 33 alternative combinations (including a "no action/no action" combination) that were not eliminated from detailed study as discussed above were analyzed for combined effects. These effects are summarized in Table 2.5. This table does not restate all the information that is displayed in Tables 2.1 (Chevron) and 2.2 (Fina) but addresses items that are of concern only if the Chevron and Fina projects were to proceed simultaneously or in similar timeframes. Table 2.5 is largely a summarization of the unavoidable and long-term effects (unmitigated effects) summarized from Tables 2.1 and 2.2 where it was determined that there may be a combined effect. The analysis of alternative combinations is discussed in detail in Chapter IV.3.

Map 2.8 displays the possible alternative combinations that could result should an alternative combination for Chevron and Fina be implemented. Map 2.9 provides a close-up view of the proposed road and trail system in the vicinity of Marias Pass and the summit recreation area. As noted on the map, several alternative combinations that access U.S. Highway 2 occur in this area.

Table 2.5
SUMMARY OF RESIDUAL UNMITIGATED EFFECTS FOR CHEVRON AND FINA ALTERNATIVE COMBINATIONS

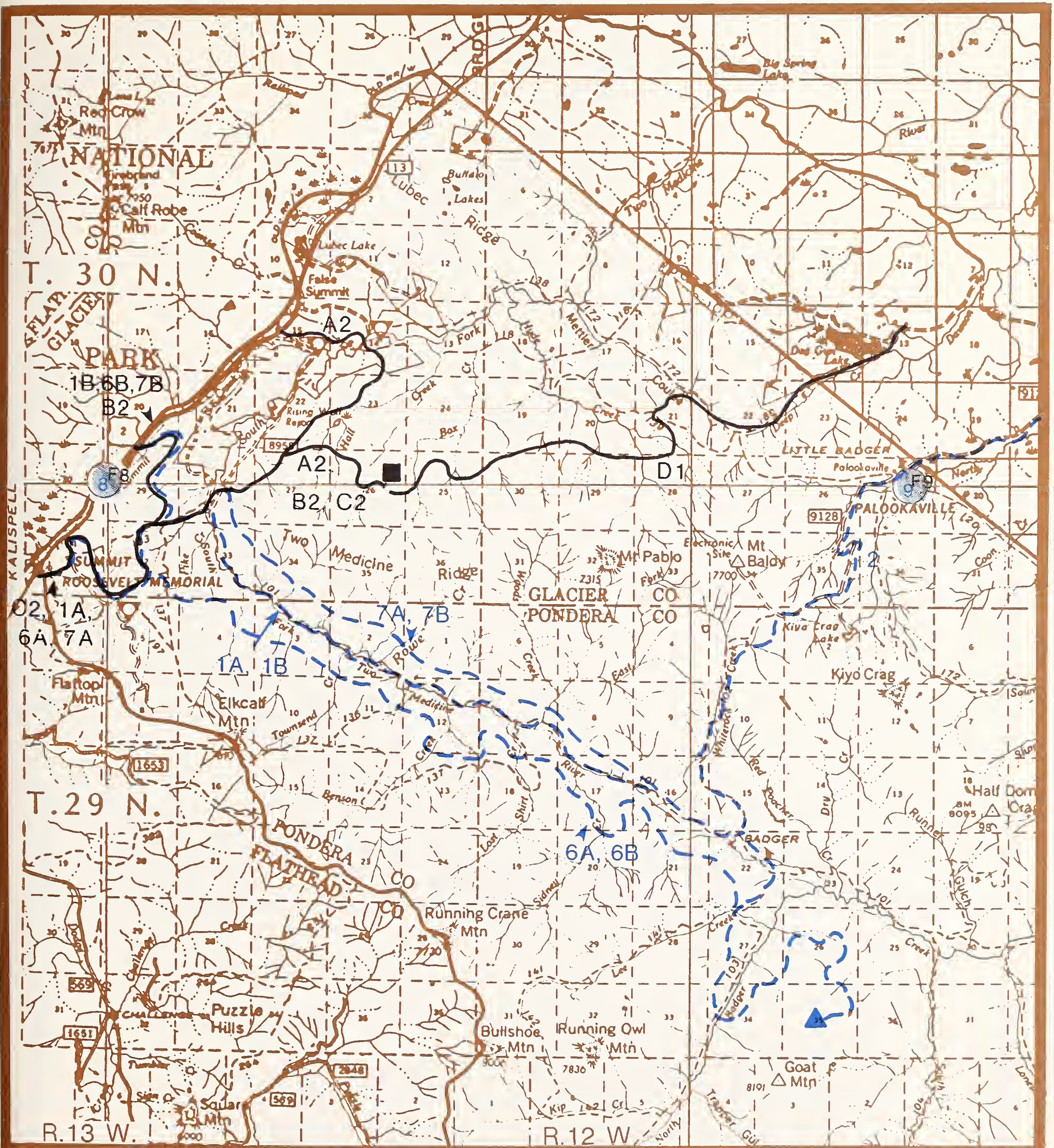
A. Opportunity for Oil and Gas Exploration and Production	Roaded alternatives that share common access will reduce cost to companies. These include alternative combinations 1A/C2, 1B/B2, 6A/C2, 6B/B2, 7A/C2, 7B/B2; Any helicopter combination alternatives would be regarded adversely by the companies because of higher cost. Any no action alternative provides no opportunity for the companies to regain prior investments. Proposed mitigation under any alternative will increase costs of exploration.
B. Water Resources	All roaded alternatives will create sedimentation from road construction and use. However, no combinations will have significant sediment increases on any drainage over the existing situation. There are no common underground aquifers that would be affected by any drilling alternative combinations.
C. Air Quality	All alternative combinations will result in the creation of dust and emissions. Emissions would be greatest on those alternative combinations using shared access. However, this will not exceed State air quality standards.
D. Access and Reclamation	(See J--Outdoor Recreation)
E. Glacier National Park and Adjacent Wilderness	Alternative combinations 1B/D1, 6B/D1, 7B/D1, and 8/D1 would be visible from Autumn Creek trail in Glacier National Park. Any roaded alternative combination from US Highway 2 will increase background noise levels in the highway/railroad corridor. Alternative combinations of 8 or F8 will add a new noise to the background level. Views and noises of combined operations will not be obvious in the Bob Marshall Wilderness Complex.
F. Badger-Two-Medicine Roadless Area	There would be no combined effects because the proposed Fina project is outside the roadless area.
G. Wildlife	Displacement of wildlife from all alternatives will be unavoidable. All alternative combinations that enter or exit on US Highway 2 will have a greater combined effect of displacement. By disallowing the projects to proceed concurrently, this effect would be reduced.
H. Fisheries	There would be no combined effects of fishing pressure because of motorized access restrictions on access roads.
I. Vegetation	None identified.
J. Recreation	Any alternative combinations that include either alternatives 1A or 1B will have the greatest effect on trail users because trail 101 would need to be relocated. All combinations of alternatives will restrict an additional 32 miles of trail to motorized use. This can be reduced by not allowing both projects to proceed concurrently. Alternative combinations that originate at Pike Creek road (includes F8 and 8) would conflict with Marias Pass recreation users.

Table 2.5 (continued)

K. Visuals	In alternative combinations 1A/C2, 1B/B2, 6A/C2, 6B/B2, 7A/C2, and 7B/B2, project roads will be intermittently visible from Continental Divide National Scenic Trail and Two Medicine-Elk Calf Mountain National Recreation Trail. There will be a visual effect on foreground views along US Highway 2 from alternative combinations 1B/B2, 6B/B2, 7B/B2, and 8/B2.
L. Cultural Values	Blackfeet Indian Traditional Culture and Religion--There should not be any interrelated effects to traditional cultural values between the Chevron and Fina proposals because both proposals are unequivocally opposed by the Blackfeet traditionalists. Blackfeet traditionalists have stated that they see no difference between proposals including locations, windows, or amount of work being undertaken at any time. However, there would be a greater likelihood of effects on traditional practices if the projects occurred simultaneously. Archaeological Resources--Potential effects to archaeological resources are regarded as site specific and happening on a one-time basis. Activity occurring in one project area would not have an effect on the other project area.
M. Blackfeet Rights	Members of the Blackfeet Tribe would be required to observe restrictions on trails and newly constructed FS system roads as specified in the Forest Travel Plan.
N. Socioeconomics	Should any of these alternative combinations occur concurrently, East Glacier Park and Browning would experience increases in employment, population, and demand for housing, goods, and services during exploration.
O. Health and Safety	The possibility of simultaneous well blowouts is extremely remote. Any alternative combinations that involve approach from US Highway 2 would increase the risk of traffic accidents, especially during adverse driving conditions. The potential risk could be reduced by not allowing projects to proceed concurrently.

IDENTIFICATION OF THE PREFERRED ALTERNATIVE COMBINATION

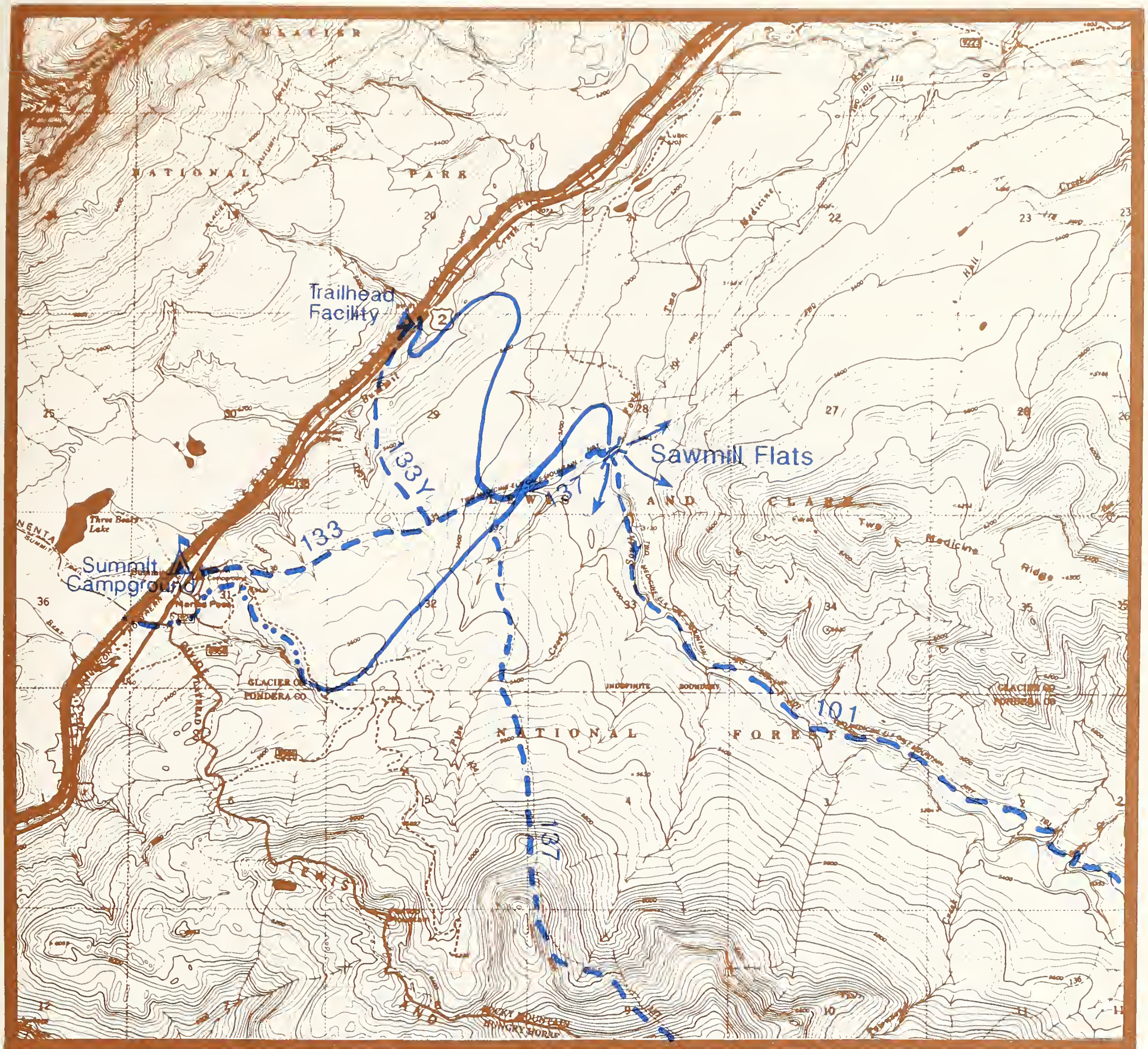
Alternative combination *A2-2* is the Forest Service and BLM preferred alternative combination. This combination may be revised or modified in the Final EIS based on comments received in the Draft EIS; and site-specific investigations would include road and well-site location and design, cultural resource clearance, botanical surveys, and identification of appropriate mitigation measures. This combination would allow both projects to proceed simultaneously without creating combined adverse effects on the environment.



Chevron Alternatives
Chevron Well Site
Fina Alternatives
Fina Well Site
Helicopter Mobilization Sites

MAP 2.8

ALTERNATIVE ROUTES



LEGEND

U.S.Highway 2

Burlington Northern Railroad

Proposed Construction near Hwy 2 for Alternatives 1A, 7A, 1B, 6B, & 7B

Proposed Reconstruction near Hwy 2 for Alternatives 1A, 6A, & 7A

Trails

MAP 2.9

ALTERNATIVE ACCESS ROUTES FROM U.S. HIGHWAY 2 NEAR MARIAS PASS

CHAPTER III. AFFECTED ENVIRONMENT

This chapter describes the environmental resources surrounding the proposed well site locations, the proposed access routes to the well sites, and any outlying areas that are potentially affected. The resources include the relevant physical, biological, social, and economic conditions that could change under implementation of an alternative, and/or background information that may assist a reader in understanding the alternatives.

A. OIL AND GAS EXPLORATION AND DEVELOPMENT

In this section, background information is provided on the regional geologic setting and on some of the problems in interpreting the local geology as it relates to oil and gas exploration and development. A summary of past oil and gas exploration and development activity as well as information on possible production considerations for the proposed well sites are also included.

General Geology

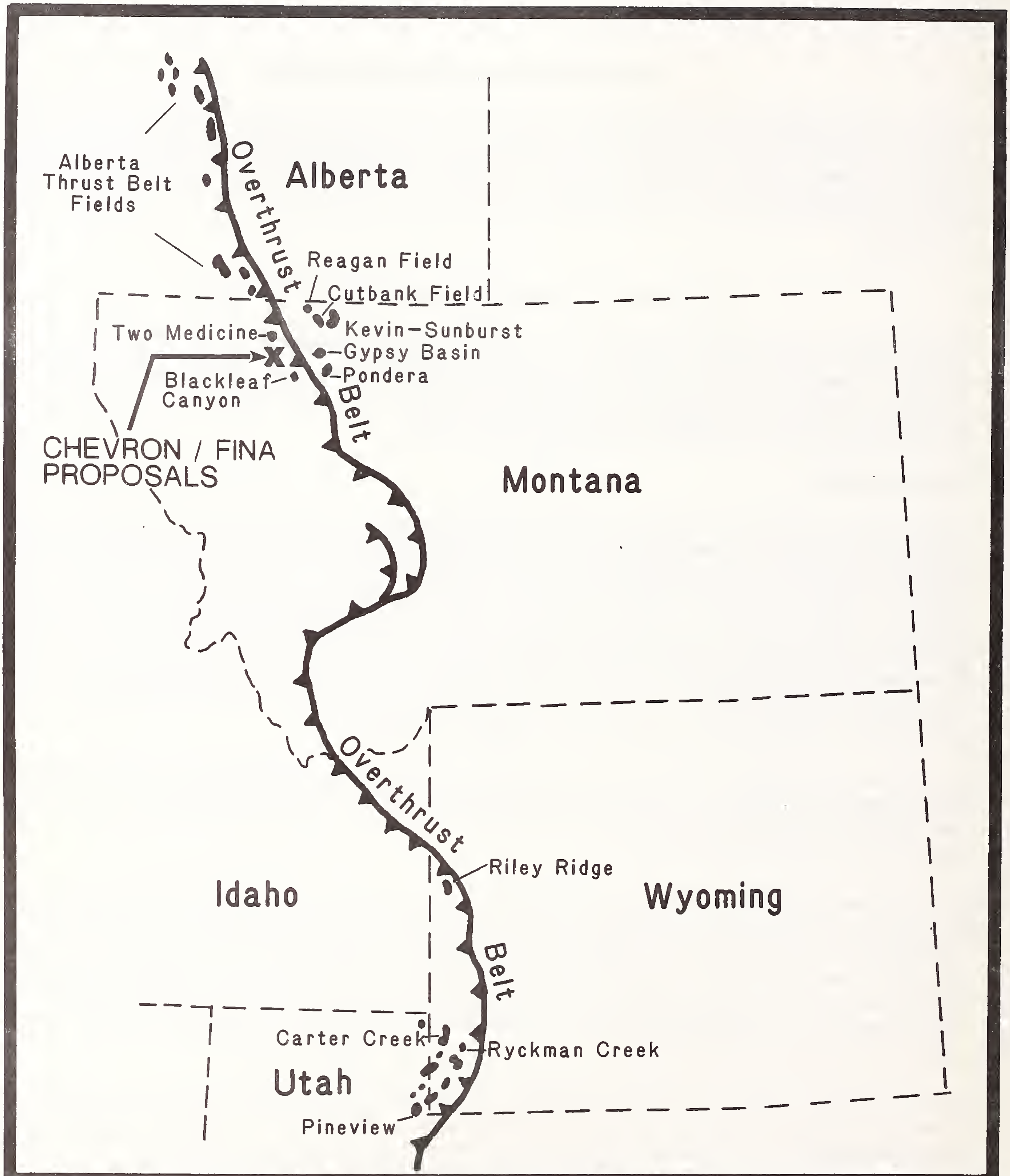
The proposed well sites are located in the Sawtooth Range in northwestern Montana. This range is characterized by north-trending, closely-spaced, west-dipping faults and numerous folds. It is the local portion of the Cordilleran fold and thrust belt, a geologic province that extends south from Alaska through Canada to Mexico (Mudge, 1982). This geologic province is also known as the Overthrust Belt in Utah, Idaho, Wyoming and Montana. Large reserves of natural gas have been developed in the Alberta, Canada portion of the Overthrust Belt eighty miles to the north (Rice, 1977). More recently, there have been major discoveries of oil and gas in the Utah and Wyoming portions of the Overthrust Belt to the south (Ver Ploeg and DeBruin, 1982). The RM-1 Unit, by virtue of its location within this type of geologic environment, has stratigraphic and structural traits very similar to these other portions of the Overthrust Belt (Map 3.1.)

In general, there are four factors that are necessary for the formation of an oil and/or gas reservoir. These factors are: the presence of source rocks, sufficiently porous and permeable reservoir rocks, an optimum amount of thermal maturation or burial to form oil and natural gas, and a geologic trap in which the oil and/or gas can accumulate and be stored.

Source rock formations in the area are sedimentary rocks that range in age from Devonian to upper Cretaceous. The Devonian Three Forks Formation is a black shale that is interlayered with thin limestone units. The organic content of the Three Forks Formation varies from significantly above average to very little, but the richer zones of this unit are considered good potential source rocks. Jurassic and Cretaceous age marine shales also provide important potential source rocks. The thickness of the rock unit is also an important characteristic for a potential source rock. For example, a thick shale unit with a high organic carbon content is a more favorable source rock than a thin unit with the same organic content.

In the Sawtooth Range, the main reservoir rock is dolomite of the Sun River Member of the Mississippian Castle Reef Dolomite. Sandstone reservoirs found in Jurassic and Lower Cretaceous rocks on the Sweetgrass Arch to the east may not be good reservoir rocks in the Sawtooth Range due to a westerly decrease in porosity and permeability. Porosity and permeability are two factors that play a crucial role in the transport and storage of hydrocarbons (Clayton et.al., 1982).

Temperature-burial history as well as the type and amount of organic matter contained in the source rock are factors that influence the nature of the hydrocarbons formed. Hydrocarbons form as gases and liquids, both which may be found in a single reservoir. Trapping mechanisms, either structural or stratigraphic, are necessary to block the movement of hydrocarbons and allow them to accumulate. Structural traps are the most numerous and important types of traps in the Overthrust Belt. In the Sawtooth Range, the complicated



MAP 3.1

LOCATION OF OVERTHRUST BELT AND RELATIONSHIP TO MAJOR OIL/GAS FIELDS configuration of folds and thrust faults have created an environment that is favorable for structural traps. Folds and thrust plates containing Paleozoic and Mesozoic rocks are the structural traps in the RM-1 Unit.

Geology of the Proposed Well Sites

Chevron's geologic information places their drilling target under Goat Mountain. Chevron's gravimetric and seismic data support the interpretation of a gravity anomaly and structural high that closes in all directions from Goat Mountain. Chevron geologists believe this represents an area where subsurface layers of Mississippian limestones are stratigraphically higher than in surrounding areas.

Because there has been no previous drilling in the target area, there remains a number of questions regarding the characteristics of the target area that can only be answered by drilling. For example, it is not known whether the target reservoir rock may have been eroded away or may not have the porosity or permeability needed to provide accumulation and subsequent removal of oil or gas. In addition, it must be determined if the seismic and gravimetric data give an accurate depiction of the target structure. It is not known how complex the subsurface folding and thrusting is, and whether it provides a reservoir structure.

Published mapping suggests that a major fold capable of acting as a structural trap passes beneath the Hall Creek vicinity, the proposed Fina well site (Mudge and Earhart, 1983). While recent seismic data may have refined the interpretation of this structure, Fina's target is intended to explore whether or not this structure contains hydrocarbons. It is important to note that surface geology indicates that the Chevron and Fina proposals are located on separate geologic structures. Information gathered from one drilled location may not be the same as that gathered at the other.

Historical Exploration and Production

There has been a considerable amount of geophysical exploration in the RM-1 Unit, starting from the 1950s. This activity peaked in the early 1980's. With the subsequent decline in oil prices, there has been a sharp reduction in the amount of seismic activity in this area (Table 3.1). Over 500 miles of seismic line have been conducted in this area, the data becoming more refined with technological advances.

Numerous wells have been drilled on the Blackfeet Reservation which lies generally east to northeast of the proposed project areas. The nearest producing well is an oil discovery in the Two Medicine field, located approximately eight miles southwest of Browning, Montana and 11 to 16 miles northeast of the proposed locations. This well is not considered to be within the same geologic structure as the proposed well sites.

The only oil and gas drilling on the Lewis and Clark National Forest occurred in 1963-64 in the Mount Baldy area, approximately six miles from either proposed wellsite. Two holes were drilled by Phillips Petroleum in Section 35, T.30N., R.12W. Both wells were dry. One was an offset after difficult drilling conditions were encountered in the first hole. The well was drilled to a depth of 11,785 feet.

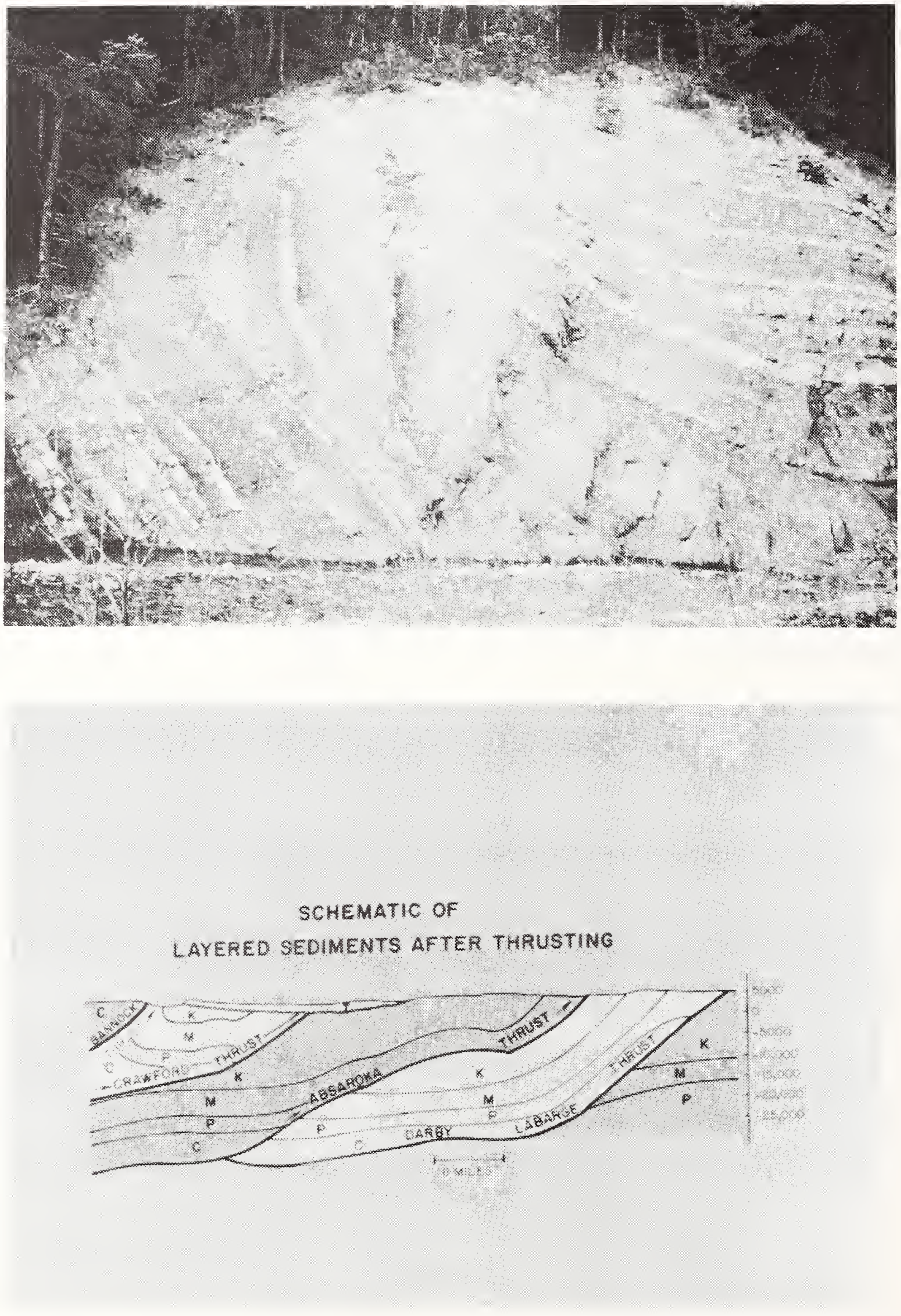
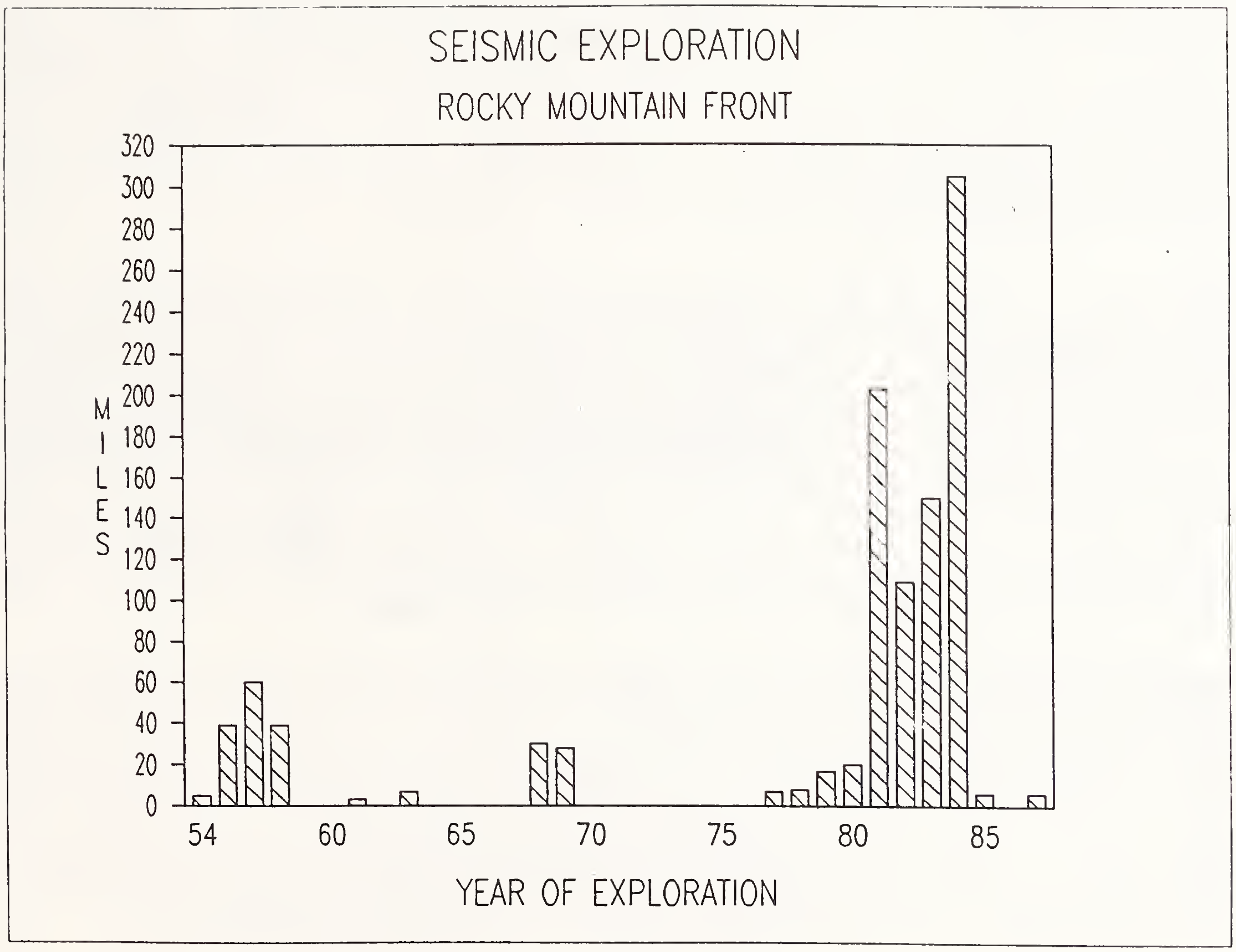


Illustration and photograph of typical overthrust stratigraphy



Miles of Seismic Exploration by Year

Presently, the only production from the Overthrust Belt on the Lewis and Clark National Forest is the Blackleaf Canyon field, nearly 30 miles to the southeast. These wells produce natural gas from the Sun River member of the Mississippian Castle Reef Dolomite (refer to Map 3.2 for well and pipeline locations.)

Production Considerations

Any production from the RM-1 Unit may be similar in characteristics to other nearby production sources. Production material would most likely contain gas, petroleum condensate and water, since the nearest production from similar formations contains all three of these components. Production would probably be from Mississippian dolomite formations which may contain small amounts of hydrogen sulfide and carbon dioxide along with the hydrocarbons. This type of production would require treatment through a separation facility as a first step in preparing the product for market. The separator would remove the gas and associated sour (hydrogen sulfide) components from the condensate and water (Figures 3.1 and 3.2). The specific type of separator required would be determined following drilling, and would be based on the actual type and quantity of oil and/or gas found. Geologic conditions in this portion of the Overthrust Belt make the liklihood of encountering large quantities of hydrogen sulfide remote. Information on hydrogen sulfide can be found in Chapter IV.O - Health and Safety.

The separation of the gas product into gas, petroleum condensate and water would involve storage and shipping of the condensate. Condensate removed from gas streams would likely be stored in tanks prior to sales. These tanks can hold a considerable amount of production. One size frequently used will hold 400 barrels (1 barrel = 42 gallons). If a well produced 250 barrels of condensate per day, at least two tanks would be used to store the liquids and shipping would probably take place directly into a pipeline. If a well produced 5-10 barrels of condensate per day, two tanks would probably be used and the shipping could be done by pipeline or truck. If shipping was done by truck, the normal procedure is to gauge the tanks daily and ship one tank at a time. The best location for these tanks would be along an all weather road. It is reasonable to assume that, after separation, the gas component may have to go through a dehydration unit to remove any water vapors left after initial separation. If the processed gas did not contain significant amounts of hydrogen sulfide, it would then be transported by pipeline to the commercial market.

The nearest gas pipeline is located along U.S. Highway 2 (Map 3.2). It is owned by the Montana Power Company and contains treated gas ready for market. The Montana Power Company has indicated their requirement for acceptance of gas into the pipeline system is no more then 0.25 grams of hydrogen sulfide per 100 cubic feet of gas (Kosseim et al., 1984). Because of these requirements, any gas produced that contains hydrogen sulfide in excess of this amount would be sweetened prior to entering into a gas pipeline (Figure 3.3 and 3.4). The sweetening process could be accomplished in three ways: 1) a gas plant could be built near the MPC pipeline; 2) the gas could be transported by pipeline approximately 50-60 miles to the Reagan Field, which is near the Canadian Border north of Cutbank, Montana; or, 3) the gas could go to the Gypsy Highview Plant near Pendroy Montana, a distance of about 30-40 miles (Map 3.2).

An oil and gas activity study (Appendix L) conducted to determine feasible development corridors in the RM-1 Unit, has identified locations that may be moderately-well or well-suited for the location of major facilities, based solely on geotechnical and foundation engineering properties. Any proposal to construct such a facility would require detailed environmental studies. There has been no such proposal at this time.

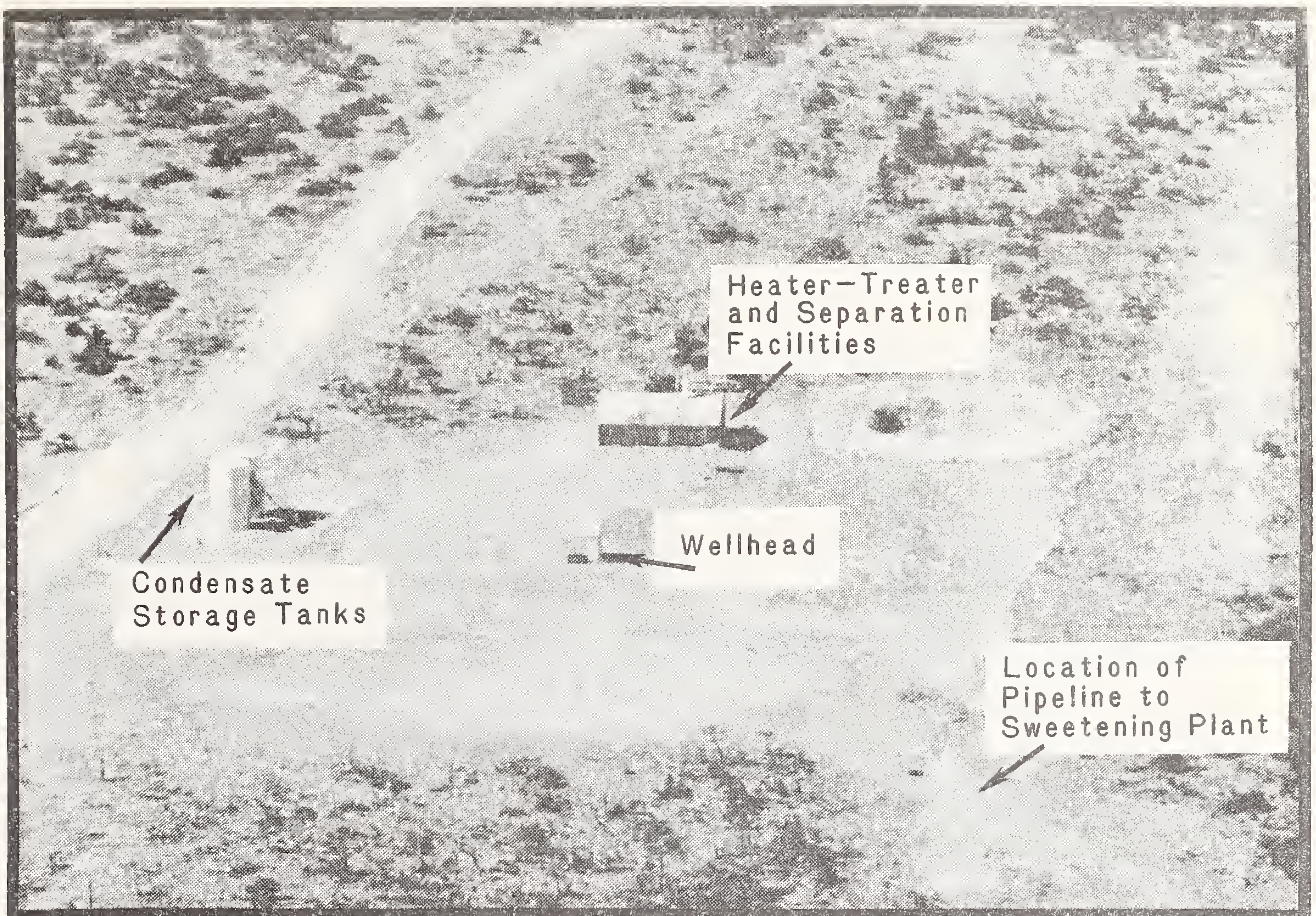

Heater-Treater and Separation Facilities
Condensate Storage Tanks
Wellhead
Location of Pipeline to Sweetening Plant

FIGURE 3.1 Typical tank battery and separation facility layout located at wellsite. (Mobil 1-8 west of Bynum)

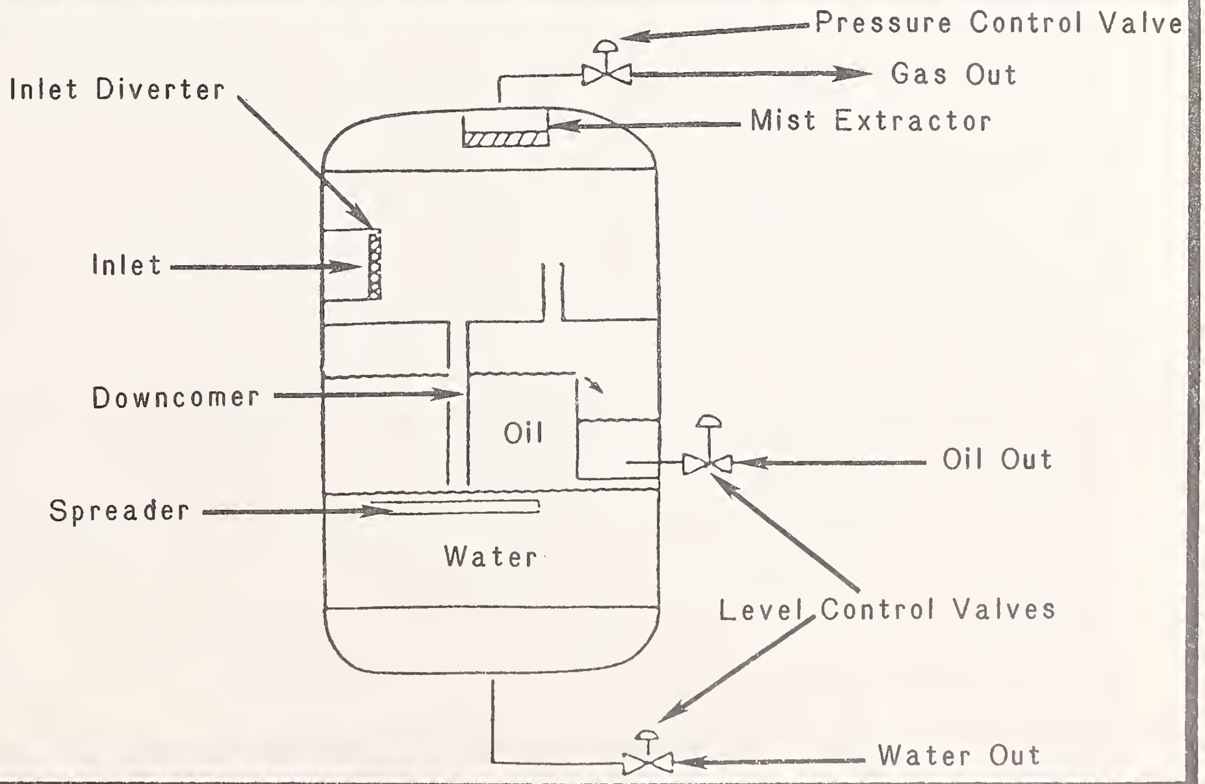
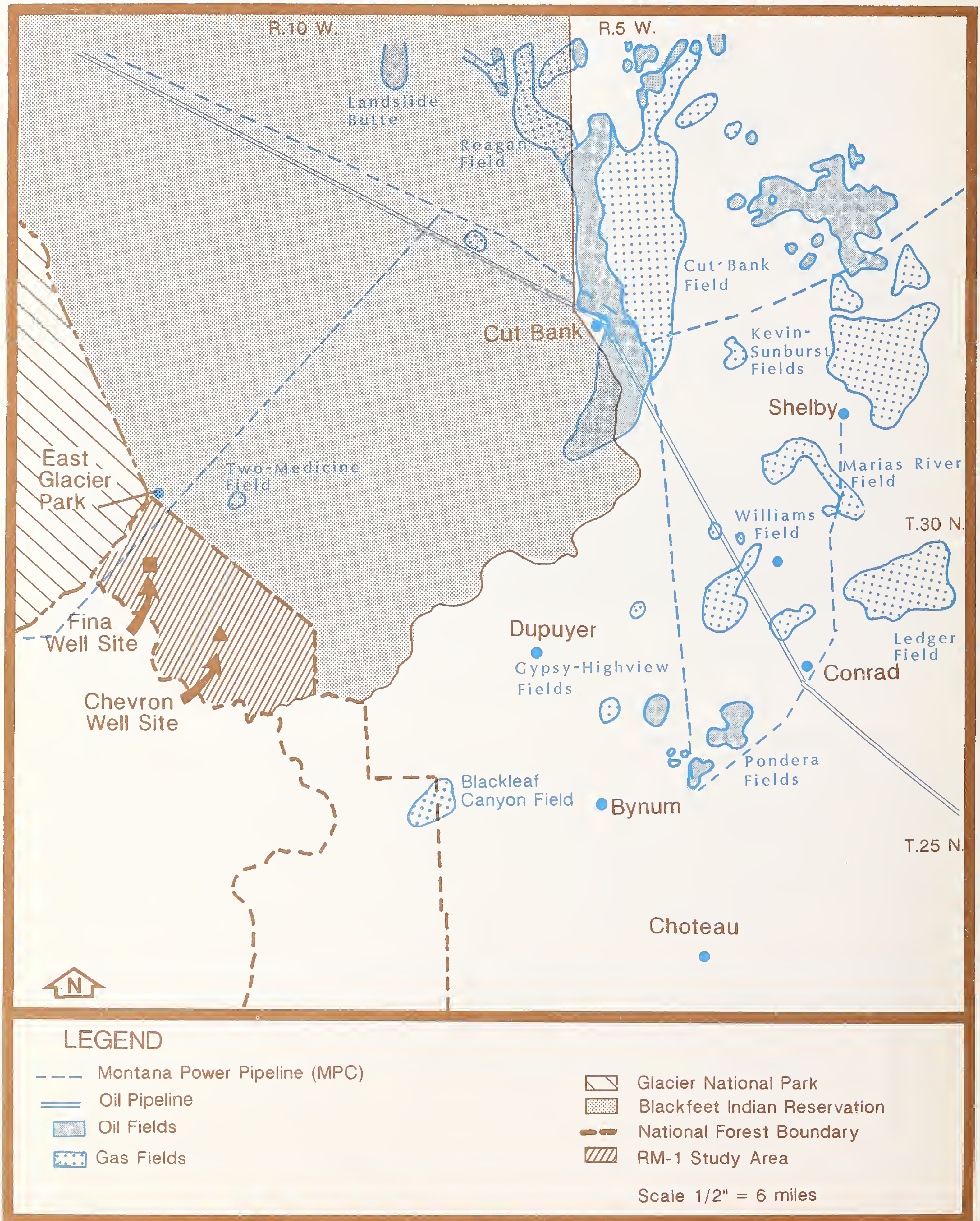


FIGURE 3.2 Diagrammatic view of three phase (oil, gas, water) separation process.



MAP 3.2 AREA PIPELINES AND FIELDS

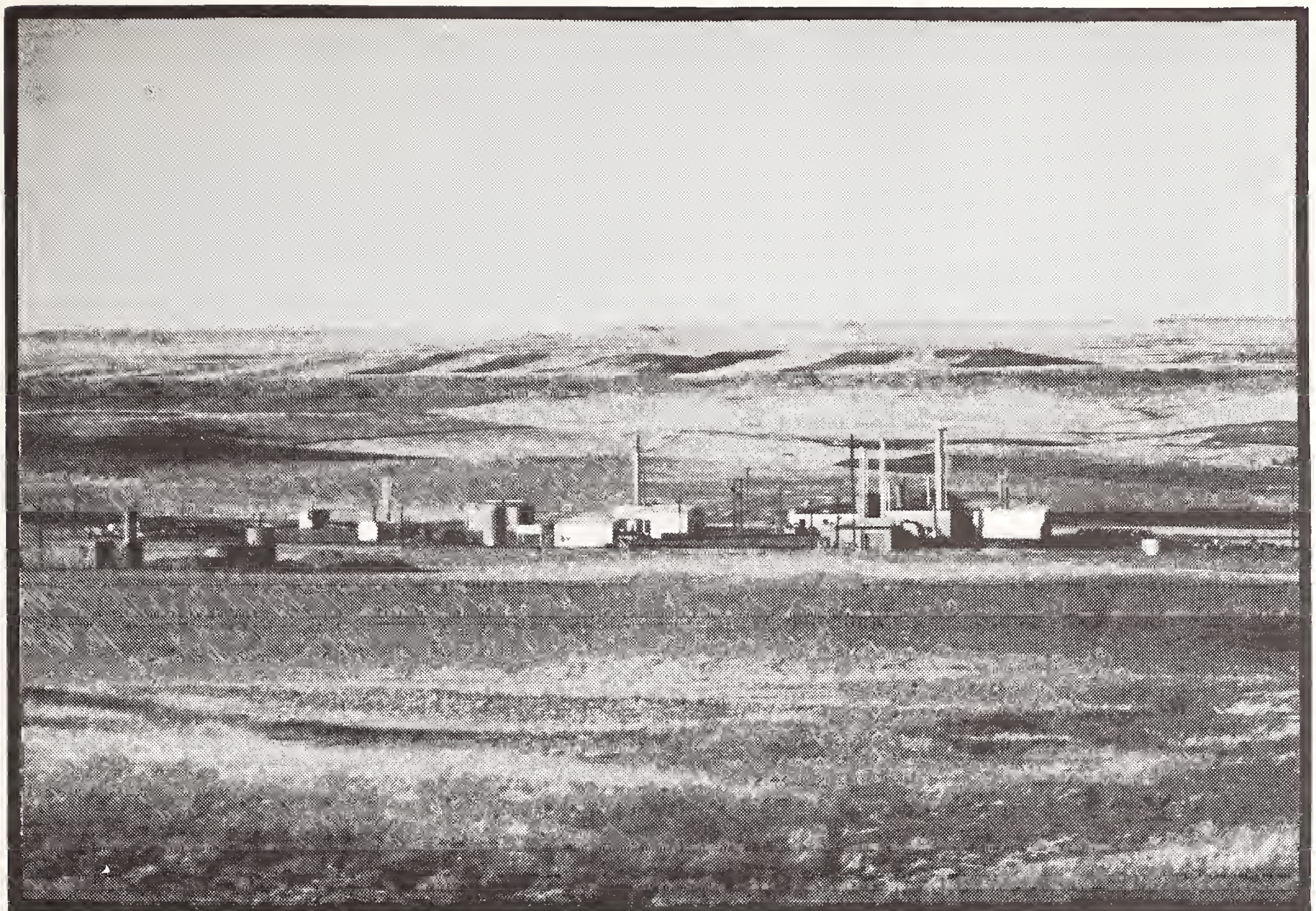


FIGURE 3.3 Layout of a small sweetening plant . MSR facility at Gypsy-Highview field, Dupuyer, MT.

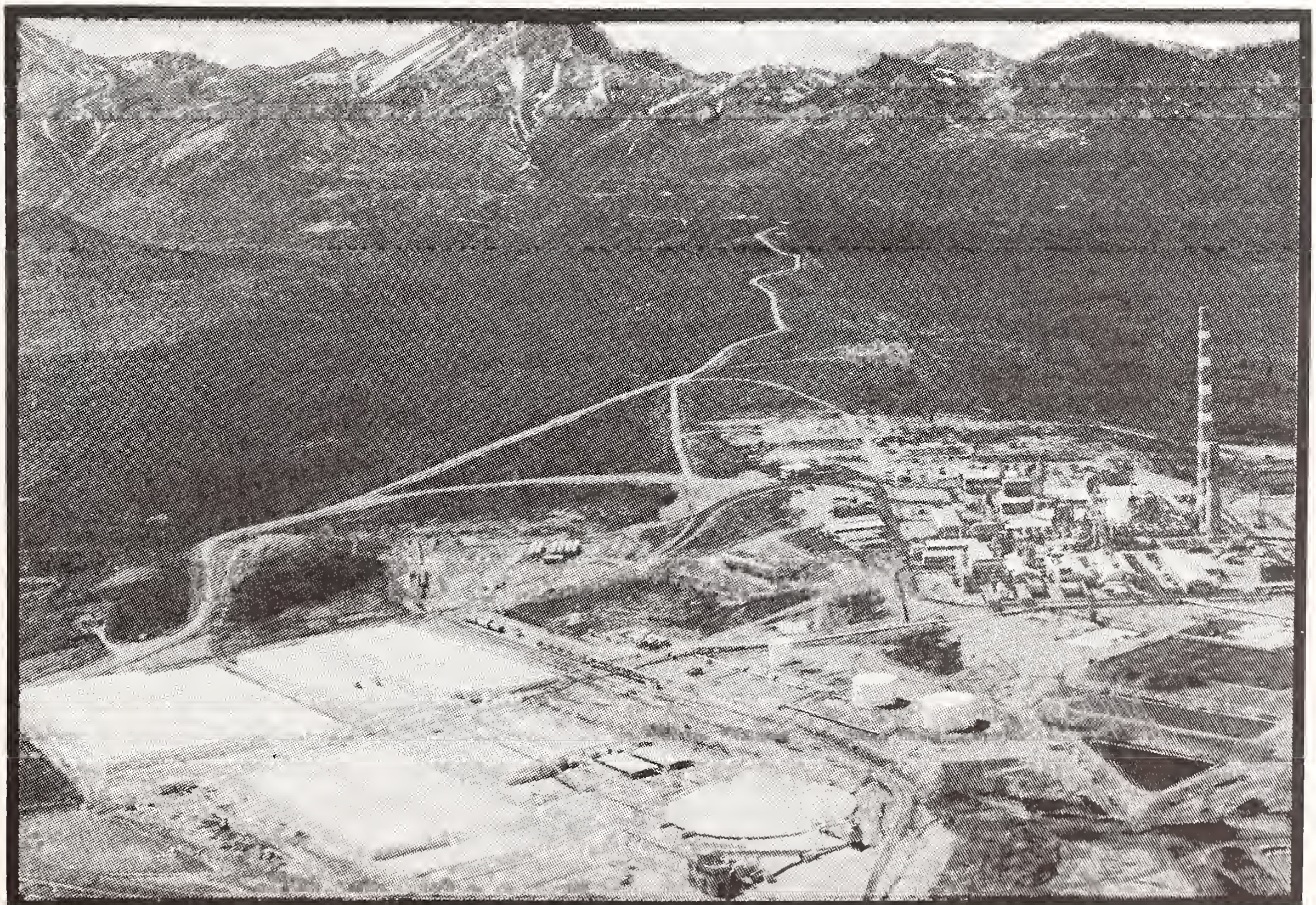


FIGURE 3.4 Layout of a large sweetening plant. Shell Canada's Waterton Gas Plant, Pincher Creek, Alberta.

B. WATER RESOURCES

This section describes the water resources associated with the project study area. Included is information on the surface water, water quality, water rights for the drainage basin, and ground water. For purposes of this analysis, discussion of water resources is limited to the RM-1 Unit. To discuss effects beyond (downstream) of the study area would not be meaningful because changes in the water regime would be very minor and imperceptable.

1. Surface Water

The land encompassing the proposed drill sites, large portions of the potential access corridors, and the entire RM-1 Unit drain into the Two Medicine River (State Basin 41M) on the east side of the Continental Divide. The major streams in the drainage system are the South Fork Two Medicine River, Little Badger Creek, Badger Creek, Whitetail Creek, and the North Fork Birch Creek. The South Fork Two Medicine River and Badger Creek have large drainage areas and include many sizeable tributaries within the National Forest boundary. Other surface water resources are limited within the National Forest to Kiyo Crag Lake, a few small glacial cirque ponds, beaver ponds, and side channel ponds. Water resources outside the Forest boundary include numerous glacial pothole lakes, including four sizeable (over 100 acres each) lakes: Mitten Lake, Horn Lake, Dog Gun Lake, and Green Lake. Swift Reservoir on Birch Creek is on the south edge of the RM-1 Unit (Map 3.3).

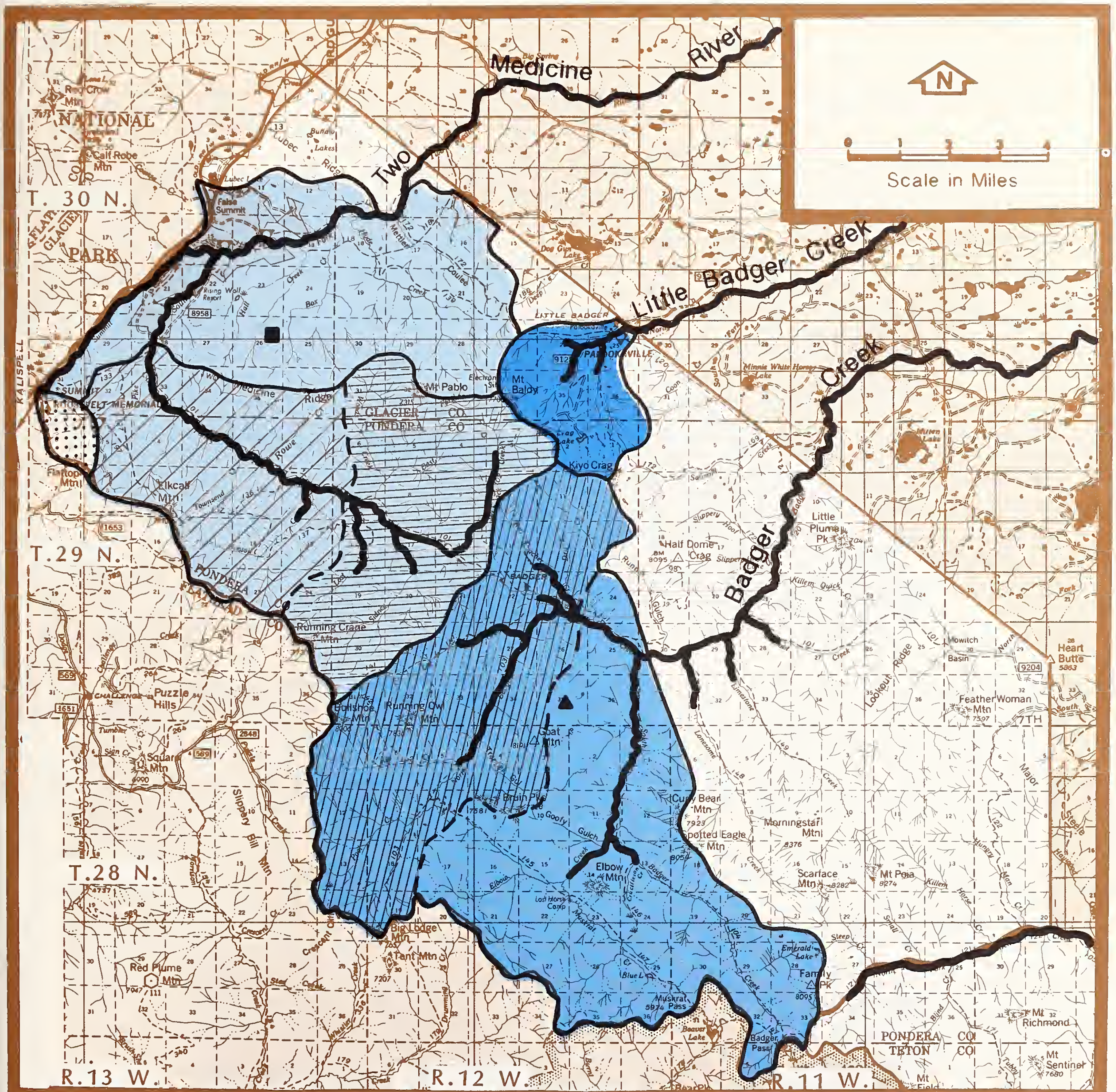
The RM-1 Unit is subject to occasional extreme rainfall events. The higher elevations of the range have shallow, steep soils that retain little precipitation. Most precipitation tends to run off. The streams are flashy with rare, extreme floods that carry substantial bedload (gravel) capable of scouring channels and leaving broad gravel bars on the larger streams. Two recent flood events, in 1964 and 1975, caused extensive scouring of stream beds in the RM-1 Unit area. The usual flow rate in the main channel of most streams drops very low, except during spring snow melt and following extreme rainfall events. This low-flow pattern has been measured for 43 years using a stream gage located on the Two Medicine River east of Glacier Park and by other streamflow records on the Rocky Mountain Front south of the study area.

A 22-year streamflow record on Badger Creek, several miles downstream from the National Forest boundary, shows an exception to this extreme low-flow regime. The Badger Creek drainage above this station appears to naturally retain water for late-season base flow. This is borne out by the fact that the stream in this location has a regular low flow of at least 50 percent more than might be expected for other streams with a drainage area of this size. One possible explanation of this phenomenon is the relatively broad valley bottom upstream from the National Forest boundary. This valley bottom may act as a natural reservoir, with a rock reef at the Forest boundary acting as a natural regulating dam.

Even though Badger Creek maintains a relatively high streamflow during low-flow periods, it floods just as readily as other streams. Peak flow and any flooding usually comes with snow melt or spring rains in May or June, but flash flooding can occur through early autumn. Precipitation from mid-autumn through early to mid-spring is usually in the form of snow. Average annual precipitation varies from about 20 inches at the lowest elevations to about 65 inches on the peaks. Average annual precipitation is about 50 inches.

Water Quality

Surface water quality in the area is very good with no measurable turbidity most of the year. Water quality may be affected in some lower-elevation areas by livestock use. Surface water has a relatively high amount of dissolved solids, reflecting the large amount of limestone and other relatively soluble rock in the watershed. This is measured by specific conductance records in the range of about 150 to 400 micromhos/cm as indicated by water quality monitoring data for monitoring stations operated between 1980 and 1983. The



LEGEND

▲ Chevron Well Site Location
■ Fina Well Site Location
Major Streams
Watershed Divisions for Analysis
Watershed Subdivisions

LEGEND Watersheds for Analysis

▨ 1-North Badger Creek to &including Red Poacher Creek
2-North & South Badger Creek (includes 1)
3-North Fork Little Badger Creek
▤ 4-South Fork Two Medicine River including Lost Shirt Creek
▨ 5-South Fork Two Medicine River
⁙ 6-Summit Creek above campground
7-South Fork Two Medicine to Mettler Coulee (includes 4, 5, & 6)

MAP 3.3

MAJOR STREAMS AND WATERSHEDS

South Fork of the Two Medicine River taken downstream of the Sawmill Flats Bridge Crossing.

View looking westward into the headwaters of the South-Fork of Two Medicine drainage.

protozoa, Giardia, is known to be a possible human health problem for drinking water in the back country and should be suspect in any of the surface waters in the RM-1 Unit (Williams, 1981).

Much of the area has shallow soils and steep slopes with glacial till that may be readily eroded. Significant rains or snow melt can bring sediment into a stream very rapidly under natural conditions, creating a muddy or highly turbid condition when a heavy load of sediment is transported. However, within a few days the streams drop back rapidly to a clear condition (no significant turbidity). In fact, the stream becomes clear faster than the rate the water recedes (Hancock, 1982).

The State of Montana water quality standard for most of the area is class B-1. Waters classified B-1 are suitable for: drinking, culinary and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

An important exception in the area is the Summit Creek watershed upstream from Summit Campground. This small watershed is classified A-Closed, suitable for drinking, culinary and food processing purposes after simple disinfection. The state water quality standard further states that public access and activities, such as livestock grazing and timber harvest, are to be controlled by the utility owner under conditions prescribed and orders issued by the Montana Department of Health and Environmental Sciences. Although the watershed is no longer used as a drinking or water system source, any proposals for this area must be reviewed by that Department and must include monitoring to protect the existing water quality.

Water Rights

There is no preliminary adjudication of water rights in the Two Medicine River Basin, nor is there likely to be one in the near future, due to the complicated issue of quantified reserved water rights for the Blackfeet Indian Tribe. These reserved water rights are intended to fulfill the purposes of the reservation (to allow the Indians to be self-supporting) with a priority date no later than the date of the reservation (Martin and Jensen, 1984). Reserved water rights are not dependent on diversion nor beneficial use dates and cannot be lost through non-use nor abandonment. These rights are thus essentially absolute but have been neither quantified nor enumerated.

The Forest Service also has reserved water rights for National Forest lands for administrative uses (primarily domestic use at administrative sites), fire control, and instream flow (non-consumptive) for channel maintenance, as necessary to secure favorable conditions of water flow (specified in the Organic Act creating the National Forest). Forest Service administrative uses are claimed under the state adjudication law for the Badger Guard Station (well and creek), the Little Badger Station, as well as potential site on Railroad Creek on the north end of the area. Water rights claimed by the Forest Service under the state appropriation system include a well for Summit Campground and numerous stockwater uses on ten streams, eight springs (including five developed with headbox and stock tank), and on the Buffalo Lakes (north end of the area). Use on private land within the National Forest boundary in the north end of the area also includes some claims for minor water use for domestic and stockwater purposes.

Substantial diversion of the Two Medicine River, Badger Creek, and Birch Creek are made outside the National Forest for irrigation and storage for later irrigation. Additional water use would require application to the state and would probably require purchase of existing water rights, though the definition of these existing rights may be difficult to establish.

2. Groundwater

All geologic units in the area can potentially contain groundwater, with the variation in yields and quality depending on the lithology of the formation. Those rock units with a high degree of porosity and permeability (unconsolidated surface gravels, sandstones, and limestones) have the potential to contain large amounts of water. Those with low porosities and permeability will contain little water.

The Mississippian age Madison Limestone Formation is a major, deep aquifer in Central and Eastern Montana in which significant recharge areas have been identified in the Little Belt and Snowy Mountains (Dowrey, 1984). Although not specifically identified as a recharge area, similar properties are expected in the Madison Limestone Formation rocks within the study area.

The large surface exposures of Cretaceous age sandstones, siltstones and mudstones are thought to contain water as a function of porosity; the mudstones containing little and the sandstones containing larger amounts. Water within these rocks may contain dissolved salts.

There is a large amount of glacial till and outwash deposits throughout the study area. Often these glacial deposits are overlain by recent accumulations of alluvial gravels, talus and colluvial material. The permeability of these materials is generally a function of the amount of clay they contain. Because of their unconsolidated nature and variability in the amount of contained clay, glacial materials, especially those that mantle steeper slopes, are subject to slumping and failure when saturated during precipitation events.

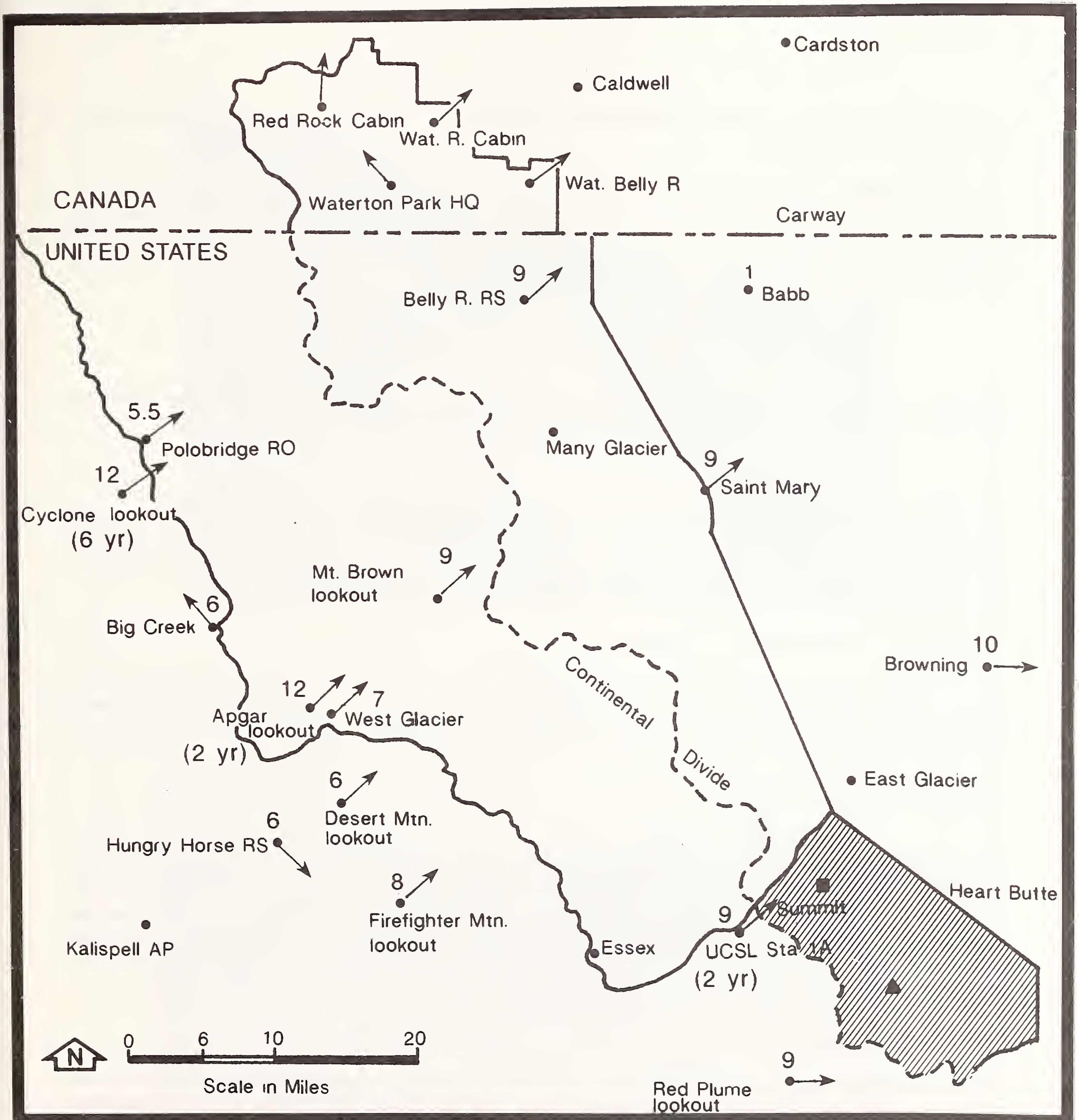
C. AIR QUALITY

The Clean Air Act Amendment of 1977 set up three airshed classes, each with set limitations for increases in baseline concentrations of sulfur dioxide and particulate matter. As would be expected, the maximum allowable increases for Class I airsheds is significantly more stringent than that of Class II or III airsheds.

The air quality standard for the RM-1 Unit is categorized as Class II. Chevron's proposed well site is located approximately 14 miles south of Glacier National Park which has Class I air quality standards. Fina's proposed Hall Creek well site is approximately 2-1/2 miles southeast of the Glacier Park border (Map 3.4). The Great Bear Wilderness and the Bob Marshall Wilderness additions were established in 1978 after the Clean Air Act and remain Class II airsheds. The Great Bear Wilderness, at its closest point, is located about 4 miles to the southwest of the proposed Chevron well site; the Bob Marshall addition is located about 8 miles to the southeast of Chevron's proposed well site and 18 miles south of the Hall Creek site.

Normal airflow patterns in the area are generally from the west to southwest (Finklin, 1986). Summertime monthly averages are shown on Map 3.4 for July-August midafternoon windspeeds. The mountain areas and areas east of the Continental Divide have a pronounced windspeed maximum in winter and a minimum in summer (July-August). Winds on peaks and higher elevations may average near 20 miles per hour during November through February. The eastside of Glacier National Park is noted for periods of exceptionally strong (and relatively warm) chinook winds during winter. Winds in this area have been reported in excess of 100 miles per hour (Finklin, 1986).

Because the prevailing wind is generally from the west and southwest throughout the year, these winds apparently are quite effective in prohibiting development of upslope, or upcanyon, winds east of the Continental Divide (Finklin, 1986). This being the case, winds in the project area likely prevail from the west-southwest and range from 5 to 15 miles per hour with occasional strong winds and mid-winter chinooks from the southwest which help maintain good air quality. The steep east faces and gentle west-facing slopes of the



July-August midafternoon average windspeed (mi/h), and prevailing direction (arrow points downwind); based mostly on available 1951-70 data. (After Finklin, 1986).

- 3 ●→ Monitoring Station (windspeed/direction)
- ▨ RM-1 Study Area
- ▲ Chevron Well Site Location
- ■ Fina Well Site Location

MAP 3.4 AIRFLOW PATTERNS

upthrusted rock units locally create variable wind patterns in the rugged mountainous terrain near the proposed well site locations.

The nearest weather station for acquiring information on wind conditions is in Browning, which is located out on the plains and approximately 19-25 air miles to the northeast of the proposed well sites. Because wind conditions (direction and speed) can vary dramatically in the mountainous terrain versus plains conditions, information from this location may not give an accurate depiction of the local weather conditions likely to be encountered in the vicinity of the well sites.

D. ACCESS MANAGEMENT AND RECLAMATION

Access for the RM-1 Unit and surrounding lands exists in five transportation systems that involve both roads and trails. These transportation systems are discussed in the following sections.

The Federal Highway System

Two highways serve as the primary access system for the area. US Highway 2 is an east/west trending route that passes north of the RM-1 Unit and serves the northwestern portion of the area. US Highway 89 is located to the east of the RM-1 Unit and serves as primary access in the north and south directions to the study area. Both highways are under the State of Montana Highway Department jurisdiction.

The Blackfeet Reservation Road System

There are three roads on the Blackfeet Reservation System that provide primary access to the RM-1 Unit. Those are BIA 1, BIA 2, and BIA 4 (Map 3.5). Reservation roads are under the jurisdiction of the Bureau of Indian Affairs who also have maintenance responsibilities. This road system consists of paved and graveled roads. These roads serve to access the northern and eastern portions of the RM-1 Unit.

Forest Service Road System

The Lewis and Clark National Forest lands in the RM-1 Unit are accessed by a limited system of Forest development roads. The primary routes include the Pike Creek Road 8958, which provides access to the western portion of the area, and the Palookaville Road 9128, which provides administrative access from the eastern edge of the Forest Boundary (Map 3.5). These roads are unsurfaced, single-lane roads regulated and maintained by the Lewis and Clark National Forest. Several Flathead National Forest roads provide limited access to National Forest lands west of the RM-1 Unit. The primary routes are the Skyland Road 569 and the Puzzle Creek Road 2848 (Map 3.5). These are also unsurfaced roads of less than two lane width.

Forest Service Trail System

The National Forest trail system provides access to the interior portions of the RM-1 Unit. There are 145.9 miles of trail maintained by the Forest Service. Major trails include the Two Medicine Trail 101, Elk Calf Mountain Trail 137, and the North Badger Creek Trail 103 (Map 3.5). Many other lesser used trails also occur in the area. The Elk Calf Mountain-Two Medicine National Recreation Trail also occurs in the area. Recreation Trails are discussed in more detail in Section III.J.-Recreation.

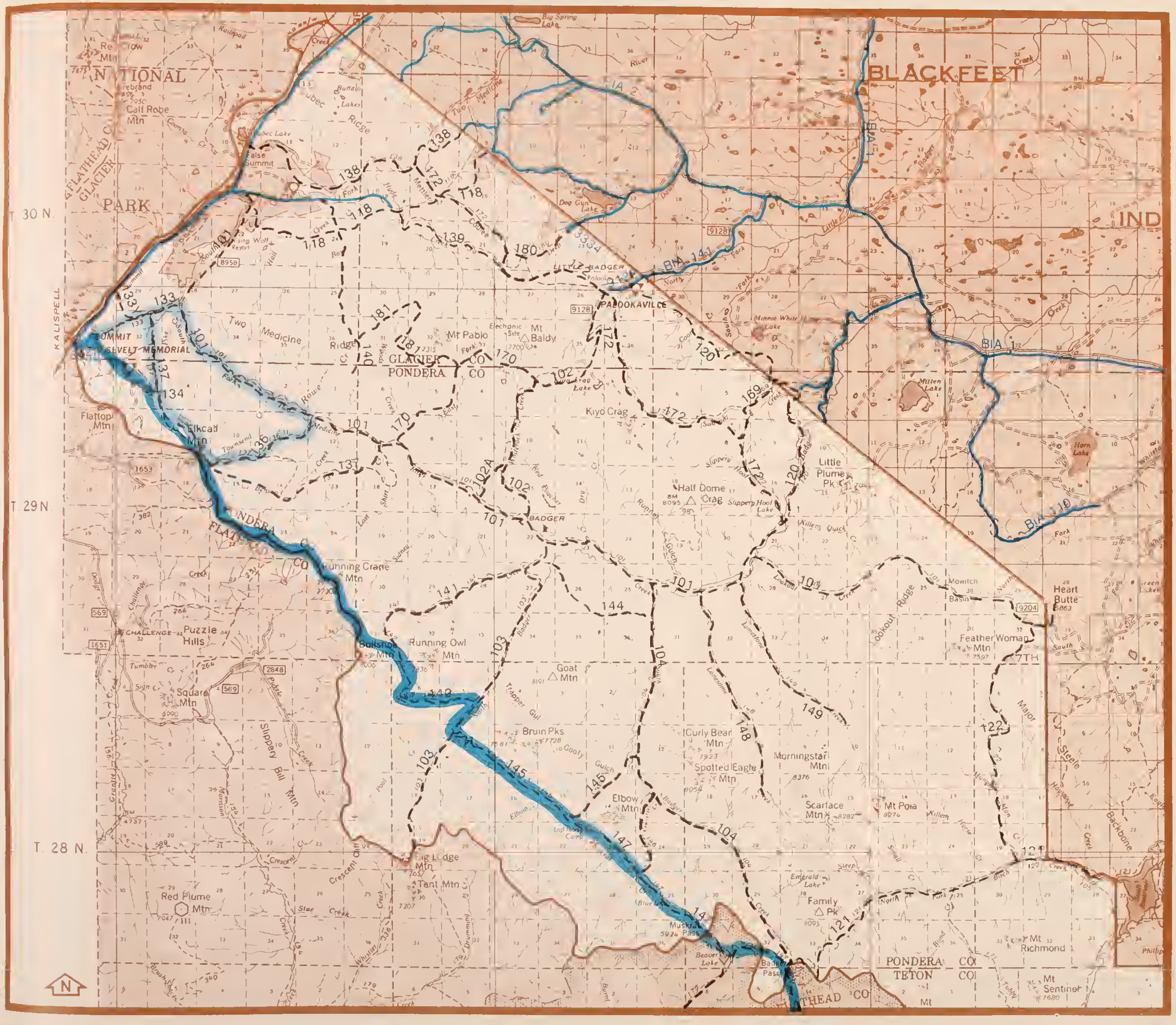
Forest roads and trails are managed according to direction in the Lewis and Clark National Forest Plan (Forest Service, 1986a). Direction for the RM-1 Unit is included in Appendix C.

View of Whiterock Road proposed for reconstruction under Chevron's alternative 2.

Badger cabin administration site.

View of Pike Creek Road 8958 looking toward Glacier National Park

View of Forest Road 9128 at Palookaville


NATIONAL
GLACIER
PARK
FLATHEAD CO
GLACIER
BLACKFEET
IND
T 30 N.
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T. 28 N.
KALISPELL
SUMMIT
ROOSEVELT MEMORIAL
PALOOKAVILLE
LITTLE BADGER
BADGER
CHALLENGE
GLACIER CO
PONDERA CO
PONDERA CO
FLATHEAD CO
PONDERA CO
TETON CO
Red Crow Mtn
Firebrand Pass
Calf Robe Mtn
False Summit
Lubec Lake
Lubec Ridge
Buffalo Lakes
Two Medicine
Mt Pablo
Mt Baldy
Elkcalf Mtn
Flattop Mtn
Kiyo Crag
Half Dome Crag
Little Plume Pk
Slippery Hoof Lake
Running Crane Mtn
Bullshoe Mtn
Running Owl Mtn
Goat Mtn
Puzzle Hills
Square Mtn
Bruin Pks
Curly Bear Mtn
Spotted Eagle Mtn
Morningstar Mtn
Elbow Mtn
Scarface Mtn
Mt Pota
Big Lodge Mtn
Tent Mtn
Red Plume Mtn
Family Pk
Emerald Lake
Muskrat Pass
Beaver Lake
Badger Pass
Mt Richmond
Mt Sentinel
Heart Butte
Feather Woman Mtn
Mowitch Basin
Lookout Ridge
Mitten Lake
Horn Lake
Minnie White Lake
Dog Gun Lake
Big Spring Lake
Slippery Bill Mtn
BIA 1
BIA 2
BIA 141
BIA 110
101
102
102A
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MAP 3.5

LEGEND

—	Primary Access Routes
- - -	Forest Trails
▬	Designated Continental Divide National Scenic Trail
▬	Two Medicine-Elk Calf Mountain National Recreation Trail

0 1 2 3 4 SCALE IN MILES

EXISTING TRANSPORTATION SYSTEM

The Primitive Road System

Numerous primitive roads provide access throughout a large portion of the local area. Most of the primitive roads are on the Blackfeet Reservation where they are primarily used for recreation and range purposes. They receive limited use by local resident traffic. Primitive roads located in the RM-1 Unit originated from prior seismic exploration activities, hunting access, and range use. The Hall Creek Environmental Assessment (Bureau of Land Management and Forest Service, 1985) and the Lewis and Clark National Forest Plan (Forest Service, 1986a) targeted many of the roads on the National Forest for obliteration and revegetation to reduce erosion damage. Other primitive roads and trails on the Forest are being considered for closure and/or revegetation under the Lewis and Clark National Forest Travel Plan (Forest Service, 1988).

Table 3.2
Area Transportation System

Transportation System	Mileage
State/County/Federal Highway	10.4
Blackfeet Reservation Roads	61.2
Forest Service Roads	49.0
Primitive Roads	203.8
Forest Trails and Other Trails	156.8

The mileage figures in Table 3.2 include total miles in the RM-1 Unit and on that portion of the Blackfeet Reservation that is located within the Badger-Two Medicine Bear Management Unit. Current traffic volume for an average 24 hour period on US Highway 2 and US Highway 89 is 1030 and 640 vehicles respectively (Montana Department of Highways, 1979). Traffic volumes on other public roads in the area, including Forest Service and Reservation Roads, is very light. The average use is less then 20 vehicles per day (Schaeffer, 1987).

The Railroad System

The Burlington Northern Railroad, along with US Highway 2, borders along the northwestern boundary of the RM-1 Unit. The railroad moves approximately 35-40 million tons of freight per year across Marias Pass. This involves on the average of 30 major trains per day, with assistance by three helper engines to overcome the steep grade. The length of the individual trains averages approximately 6,000 feet, and ranges from nine car Amtrack trains moving 800 tons, to large unit grain trains moving 12,500 tons. Total movement on the pass amounts to an average of 30 major trains and 20 trips by helper engines, or 50 movements per day (Keim, 1988).

E. GLACIER NATIONAL PARK AND ADJACENT WILDERNESS

Glacier National Park and the Bob Marshall and Great Bear Wildernesses were designated by Congress for special management and public use that is generally non-conforming with industrial activities such as oil and gas exploration and development. Management of both the units is designed to accommodate public use while preserving the natural character and ecological processes characteristic of the respective areas.

Glacier National Park

Glacier National Park lies immediately north of the RM-1 Unit. The Park boundary common with the study area is approximately nine miles long and is separated physically by a travel corridor containing US Highway 2 and the Burlington Northern Railway (Map 1.1).

The goal of National Park Service resource management is to restore and protect Glacier's naturally functioning ecosystem and to allow natural processes to play their role in maintaining the integrity of all components of the ecosystem, while providing for visitor use, enjoyment, and education without undue adverse impacts and interference (Gregory, 1986). Park resource management is responsible for: 1) the restoration of ecosystem components damaged in the past; 2) mitigation of ongoing impacts; and 3) prevention of future damages. Management emphasis is based on the philosophy of prevention because it is believed that a natural ecosystem cannot be fully restored once it is damaged and because the cost of prevention is much less than restoration. A ten year management strategy for the Park is identified in the Park Service publication: A Management Strategy for Glacier National Park, 1982-1992 (National Park Service, 1987).

The Glacier National Park ecosystem is relatively pristine--perhaps one of the most pristine in the world. However, damaging agents such as air pollution, acid deposition, water pollution, or water diversions could quickly and forever alter the naturally functioning ecosystem. The intangible value of Park recreational opportunities, genetic material and gene pools, parks as outdoor laboratories for scientific study and as stocking warehouses for threatened or endangered species are important. Air quality, wildlife, solitude, and naturally functioning ecosystems also have real value, though not quantifiable.

Although Glacier Park receives in excess of one million visitors annually, most of this use does not occur in the vicinity of the study area. Park lands adjacent to the study area are generally removed from the scenic attractions and unique features that draw public use. Cross-country skiing is becoming popular in Park lands along US Highway 2.

Bob Marshall and Great Bear Wildernesses

The southern boundary of the RM-1 Unit is shared in common with the boundaries of the Bob Marshall Wilderness with approximately thirteen miles of common boundary, and the Great Bear Wilderness with approximately six miles of common boundary (Map 1.2).

The contiguous Bob Marshall and Great Bear Wildernesses offer outstanding opportunities for those seeking solitude or a primitive and unconfined type of recreation. It contains ecologic, geologic, and other features of scientific, educational, historic, and scenic value. Among its distinctive features are four threatened and endangered species including the bald eagle, peregrine falcon, the grey wolf and the grizzly bear. Other wildlife which add to its character are golden eagles, osprey, lynx, wolverine, cougar, fisher, mink, bighorn sheep, deer, elk, moose, mountain goats, and black bears. Numerous species of non-game animals also inhabit the area.

The Continental Divide divides the wilderness complex into two distinct climatic zones, e.g. moist, cool western slopes and drier eastern slopes. Main valleys are mostly broad and gentle. Surrounding mountains are rugged, and characterized by huge limestone cliffs such as the Chinese Wall located to the south of the study area. Tree cover varies from scattered timber with open parks in the valley bottoms to heavily timbered slopes graduating into subalpine forests. Predominant trees on the westside of the Continental Divide are larch, Douglas-fir, ponderosa pine, lodgepole pine, spruce, subalpine fir, alpine larch, and some white bark and limber pine. East of the Divide, tree cover consists of Douglas-fir, lodgepole pine, spruce, subalpine fir, alpine larch, and some white bark and limber pine. Trees are slower growing on the east side of the Divide, and are substantially smaller than the trees in the moist climate to the west.

Patterns of use in the wilderness have been shaped by the location of natural attractions, forage, trails, topography, and proximity to end-of-the-road facilities. In the past, use during the summer has been primarily packstock-oriented. However, present trends indicate an increase in hiking and backpacking, fishing and sightseeing. Diversity of recreation activities is increasing to include river floating, photography, bird watching, fossil hunting, and nature study. Fall hunting is very popular; an activity nearly 100 percent supported by stock use. Ski touring and snowshoeing are popular in the winter.

The average visitor's length of stay in the wilderness is less than one week. Many out-of-state visitors depend upon the services of commercial outfitters to permit them to visit the wilderness. Visitor use is concentrated along trails in major drainages because of ease of travel, availability of campsites with forage, and the presence of certain key attractions such as rivers, lakes, or streams. Because of this concentrated use, some campsites show signs of overuse and have sanitation problems.

Although there is very little or no grazing by domestic sheep or cattle in the wilderness complex, there is considerable grazing by horses used by the Forest Service, commercial outfitters, and private parties. Natural conditions do not always prevail where stock are present. In some cases, the natural ecology has been upset by overgrazing, trampling, puddling of wet soils, changes in plant composition, introduction of exotic plants (both noxious weeds and good forage species), and soil erosion. The most serious problems are associated with heavily-used campsites and use areas. There are some areas of conflict between livestock and big game.

One of the values of wilderness is that it is a control for which other management areas can be compared. However, man's use of these wildernesses has resulted in a number of other activities. Some of these activities have affected the natural character of these lands, including:

-Effective fire control - fewer burned acres than would occur under natural conditions.
-Concentrated use by man - increased person-caused fires in areas of heavy use.
-Pollution - littering, garbage, detergents, human waste, and stock waste are problems.
-Fish stocking - some lakes have been stocked, with either native or non-native species.
-Facilities - cabins, fences, trails and signs, phone lines, outfitter camps, and bridges are present.

In contrast to the amount of use that the Bob Marshall and Great Bear Wildernesses receive, the visitor use in the undeveloped land adjacent to the RM-1 Unit is light. The vastness and remoteness of the area have aided management in sustaining a high level of wilderness quality in these adjacent wilderness lands. The Bob Marshall, Great Bear, Scapegoat Wildernesses Recreation Management Direction (Forest Service, 1987) provides overall management direction for these wildernesses. Under this direction, the wilderness lands adjacent to the RM-1 Unit would continue to be managed in a way that emphasizes sustaining and enhancing the natural ecosystem. There are no specific prescriptions in the Direction related to oil and gas exploration on adjacent lands. The potential effects of the proposed Chevron and Fina projects on the wildernesses are discussed in Chapter IV.

F. BADGER-TWO MEDICINE ROADLESS AREA

The Badger-Two Medicine Roadless Area Is a subunit of the Bear-Marshall- Scapegoat-Swan Roadless Area (1-485) described in detail in the Lewis and Clark National Forest Plan (Forest Service, 1986a, Appendix C). The area is a contiguous parcel of National Forest System land approximately 102,100 acres in size (Map 3.6). Its boundaries are defined by existing wilderness, major terrain features, and the National Forest boundary.

The analysis of roadless lands, documented in the Supplement Environmental Impact Statement for the Lewis and Clark National Forest, described each roadless area, the resource values considered, the range of alternative land uses studied, and the effects of management under each alternative. As a result of the analysis, none of the lands within the Badger-Two Medicine Roadless Area were recommended for inclusion in the National Wilderness Preservation System. The selected Forest Plan alternative allocated the Badger-Two Medicine Roadless Area to non-wilderness classification (see Forest Plan Record of Decision, page 14).

Natural Integrity and Appearance

The Badger-Two Medicine Roadless area is classified to be within a Class II ambient air quality airshed. Reduction of air quality results from occasional wildfires and is usually of short duration. Visibility from vistas is sharp and distinct; clarity of the air is excellent.

As stated previously, major drainages in the area include the South Fork Two Medicine River, Badger Creek, Whitetail Creek and the North Fork of Birch Creek. These streams and their tributaries were affected by major floods in 1964 and 1975. The South Fork Two Medicine River and Badger Creek were especially impacted. Segments of their channels have the characteristic braided and scoured appearance associated with flooding. Much of the streamside willow cover that was eliminated during flooding is just now starting to recover.

Other surface water resources are limited to a few small glacial cirque ponds, side channel ponds and beaver ponds which are particularly noticeable in the upper reaches of the South Fork of the Two Medicine River between Whiterock and Woods Creek. Water quality in the area is considered good with no turbidity most of the year, though water quality may be affected in some lower-elevation areas by livestock use. Additional information on water quality is found in Section III.B-Water Resources.

Slopes in the unit vary from steep to gentle, dissected by the numerous canyons and drainages. The southern portion of the Badger-Two Medicine Roadless Area is distinctly more rugged than the northern portion. Tree cover varies from scattered timber with open parks in valley bottoms to heavily timbered slopes graduating into subalpine areas. Large fires in the early 1900s resulted in the establishment of extensive stands of lodgepole pine particularly in the broad glaciated valley of the South Fork Two Medicine River. Other vegetation types include: subalpine fir, spruce, whitebark pine, aspen, and fescue grasslands. No endangered or threatened plants are known to occur in the area although there are some sensitive plants (Section III.H-Vegetation).

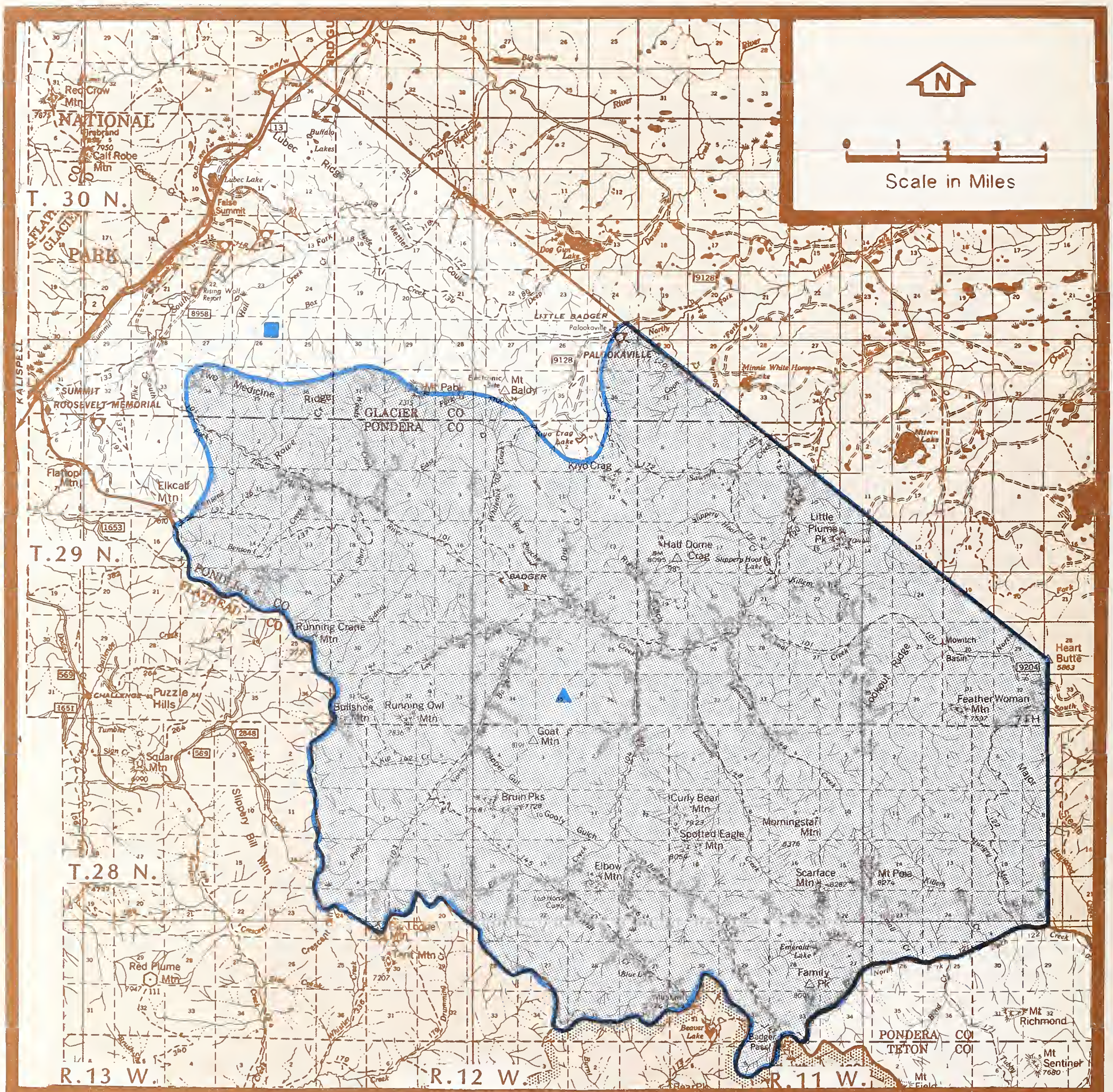
Although the area is somewhat remote, it is accessible by motorized vehicles. Access is primarily provided from points along US Highway 2 on its northern boundary and to a lesser extent from County and private roads along its eastern boundary. Within the 102,100 acres of roadless land, there are 1.8 miles of Forest Development Roads, 14.4 miles of roads and trails designated for administrative purposes and 106.5 miles of Forest trails. Trail vehicles, snowmobiles and motorcyclists use most of this system. It is estimated that the area provides 3,360 Recreation Visitor Days of motorized use annually. Human activity is evident, though most impacts are concentrated along travel corridors and along the exterior boundaries.

Another land use activity that is prominent in the area is livestock grazing. There are three cattle allotments and one sheep allotment within the roadless area; the total area supporting 1,020 Animal Unit Months. Natural conditions do not always prevail where stock is present. Plant composition and the introduction of exotic plants (both noxious weeds and good forage species) have been influenced by the presence of livestock.

Primitive roads, livestock grazing, trails, and motorized use in portions of the area detract from the natural setting and solitude sought by some recreationists.

Challenge

The topography is rugged, particularly south of the North Badger and Badger Creek drainages. Ridgetops are broken by outcrops and precipices. Notable peaks include: Morningstar, Scarface, Poia, Curly Bear, Spotted Eagle, Goat and Feather Woman. Elevations range from 4,600 feet along Badger Creek to 8,376 feet atop the summit of Morningstar Mountain.



LEGEND

- ▨ Badger-Two Medicine Roadless Area
- ▲ Chevron Well Site Location
- ■ Fina Well Site Location

MAP 3.6

BADGER-TWO MEDICINE ROADLESS AREA

To left is an aerial view of Badger Creek looking east from the interior of the RM-1 Unit.

The photo below is a view of Slippery Hoof Lake in the RM-1 Unit

The area presents good opportunities for experiencing independence, closeness to nature, and self-reliance through the application of primitive recreation skills. These opportunities occur in an environment that offers a moderate to high degree of challenge and risk.

Solitude

The Badger-Two Medicine Area's large size along with the Great Bear and Bob Marshall Wildernesses bordering along the southwestern boundary, and Glacier National Park bordering along the northern boundary, provide a large land mass that is relatively free of human influence. The reader is referred to Section III.E-Glacier National Park and Wildernesses, for additional information on this subject. Opportunities for exploring and experiencing isolation from the sights and sounds of man, with the probability of encountering others, varies depending on season and location.

Some practitioners of Blackfeet religion find the area provides the degree of privacy and isolation considered important for the conduct of native religious practices. In addition, some wilderness advocates believe that the area provides the degree of solitude sought in a wilderness experience.

Primitive Recreation

The major opportunity provided in the Badger-Two Medicine Roadless Area is a mix of motorized and non-motorized dispersed recreation in a semi-primitive setting. Hunting is a major use of the area. Most activity is concentrated along the west side of the South Fork Two Medicine River. Two outfitter base camps are located in the area, one on the South Fork Two Medicine River at Townsend Creek and another along Badger Creek near Runner Gulch.

Use conflicts do occur during summer/fall between people seeking more primitive recreation settings and opportunities (backpackers and hunters) and people using primitive roads and trails in the area (people hunting from all-terrain vehicles). Recreation opportunities are discussed in greater detail in the Outdoor Recreation section of this chapter.

Other Features

The Badger-Two Medicine Roadless Area lies within a large physiographic area known as the Rocky Mountain Front. The Front is an abrupt transition between the North American Great Plains and the Rocky Mountains. As such, it provides a high degree of wildlife and wildlife habitat and spectacular scenery. Views of Glacier National Park, wilderness areas and surrounding prairies and valleys can be seen from many of the peaks and ridges. Among its distinctive features are four species of mammals and birds which have been listed by the US Fish and Wildlife Service as endangered or threatened. These species are the grizzly bear, gray wolf, peregrine falcon and bald eagle. The wildlife resource is discussed in greater detail in Section III.G-Wildlife in this chapter.

Status of Management

The Badger-Two Medicine Roadless Area was was once part of the Blackfeet Indian Reservation. The Treaty of 1855 and Agreements of 1888 and 1896 between the Blackfeet Indian Nation and the United States reserved for members of the Blackfeet Indian Nation certain use rights on these lands (refer to Section III.M-Blackfeet Reserved Rights).

The Badger-Two Medicine Roadless Area has been considered unavailable for wilderness classification because of Blackfeet reserved rights and the historical opposition to any such designation by the Blackfeet Tribe. This was borne out by Congress in the passage of PL 94-557 (Oct. 1976) requiring the Great Bear Wilderness Study. The original bill (S 392) included 20,000 acres of tribal rights area; however, the 20,000 acres were removed by Congress from the Great Bear Study Area before passage of the final law. More recently, the Tribe has indicated it would agree to a wilderness study for the RM-1 Unit (Appendix J, correspondence from Earl Old Person, dated June 9, 1988).

The Badger-Two Medicine Roadless Area is also encumbered by oil and gas lease rights. Oil and gas leases have been granted for this entire area with restrictions on occupancy. The leases were issued in 1981 and 1982 based on the *Environmental Assessment for Oil and Gas Leasing on Nonwilderness Lands* (Forest Service, 1981), and reviewed again in the 1986 Forest Plan and accompanying EIS, (see Chp.I. E.). The leases grant the operator a reasonable opportunity to explore for and develop oil and gas resources, subject to the lease terms on requirements of the Forest Plan. Many of the leases are currently in suspension pending decisions on the Chevron and Fina drilling applications. Seismic activity in recent years has been extensive. The entire area is considered as having a high oil and gas potential.

A portion of the Middle Fork Flathead River Roadless Area is contiguous with the Badger-Two Medicine Roadless Area. The Middle Fork unit, which is part of the Flathead National Forest, was evaluated as a roadless area in the Flathead National Forest Plan EIS (Forest Service, 1985). Management direction for these lands is similar to that of the Badger-Two Medicine Roadless Area, with emphasis on providing a variety of semi-primitive, non-motorized opportunites.

G. WILDLIFE

This section describes the affected environment with respect to wildlife. For this purpose, individual species are discussed under three headings: Threatened and Endangered Species, Big Game Species, and Other Wildlife Species. A discussion of the Interagency Rocky Mountain Front Wildlife Monitoring/Evaluation Program guidelines (BLM, 1987), generally referred to as the Rocky Mountain Front Guidelines, is provided initially as a foundation for discussion of individual species. The Guidelines represent a summary of the most current wildlife research in the area and also provide a management framework for activities that may impact wildlife. The Rocky Mountain Front Guidelines are recognized in the Lewis and Clark National Forest Plan as management guidelines of land-use activities occurring within the habitat of grizzly bear, elk, mountain goat, mule deer, bighorn sheep and raptors on the Rocky Mountain Front (BLM, 1987). In addition, the grizzly bear guidelines in the Rocky Mountain Front Guidelines and the Interagency Grizzly Bear Guidelines (Forest Service, 1987) are recognized as standards for grizzly bear management in the Lewis and Clark National Forest Plan (Forest Service, 1986a, p. 2-33).

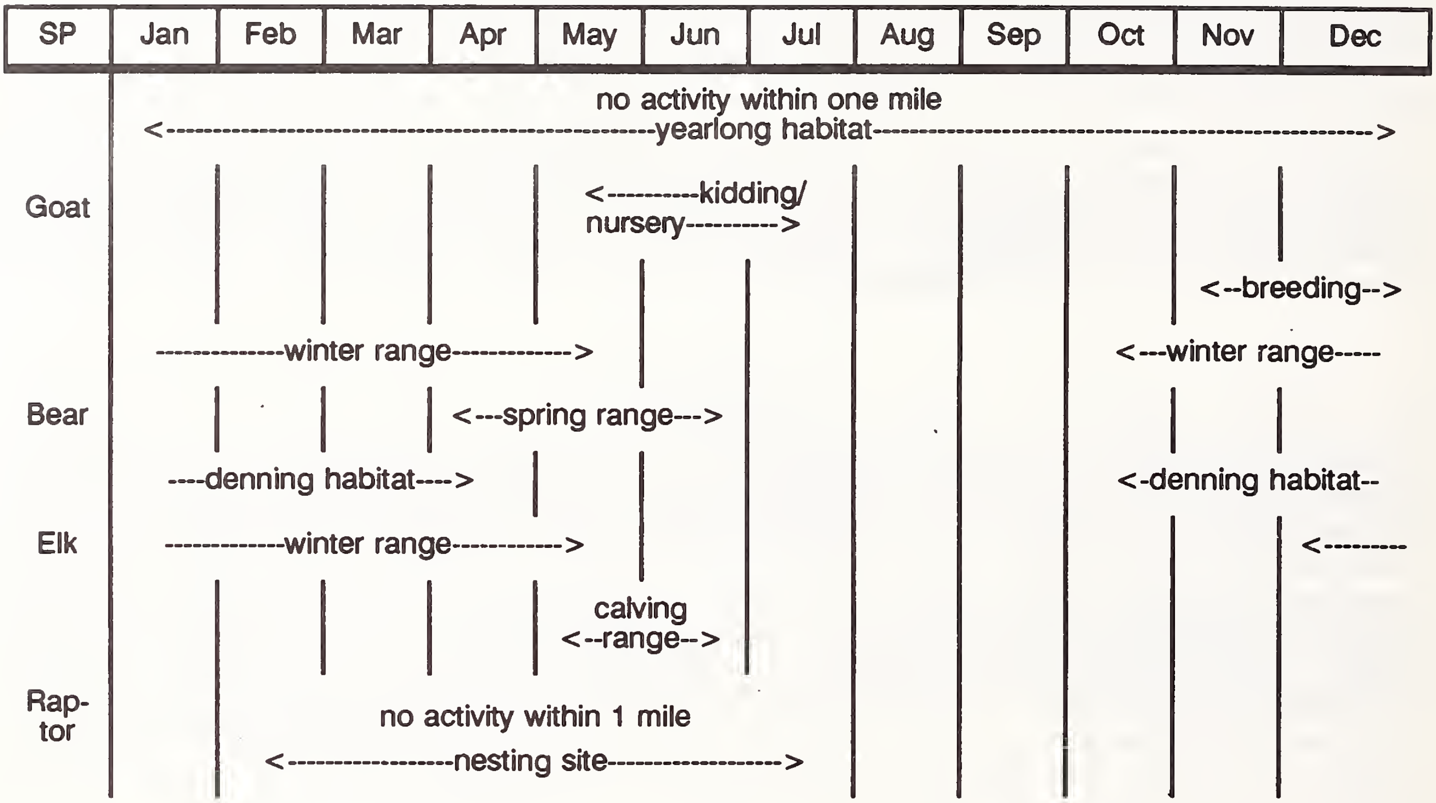
1. Rocky Mountain Front Guidelines

The Interagency Rocky Mountain Front Monitoring and Evaluation Program began in 1980. Participants in the program were drawn from personnel within the BLM, US Fish and Wildlife Service, Montana Department of Fish, Wildlife, and Parks, and the Forest Service. The principal goal of this program was to sponsor study efforts whereby wildlife management guidelines based on sound scientific finding could be developed to aid land managers in their planning of human activities along the Rocky Mountain Front.

Two committees were formed from interagency staff; an executive committee to provide management direction, and a technical committee to complete research and develop technical guidelines and recommendations. The major task of the program was to complete research on selected wildlife species that inhabit the Rocky Mountain Front and draft guidelines for different management activities so that impacts on wildlife species could be lessened. A final set of management guidelines, the Rocky Mountain Front Guidelines, were the result of this program (BLM, 1987).

The Guidelines are established on a window concept where timing restrictions for human activities are identified to reduce impacts to seasonal wildlife ranges. Table 3.3 shows the important wildlife seasonal use restricted periods and the windows (months with no lines) of opportunity identified when little impact to wildlife would occur as a result of human activity.

Table 3.3
Important Wildlife Seasonal Use Periods
for Species of Concern in the RM-1 Unit



The information summarized in Table 3.3 is used in Chapter IV to analyze the effects of the proposed project on selected wildlife species of concern, as well as to identify windows when activity could be permitted with little or no effect on wildlife populations.

As stated in the Guidelines, it is the responsibility of the decisionmakers within each agency to determine what is a reasonable and prudent application of these guidelines for each project. Any departure from these guidelines, the effects resulting from that departure, and the reasons for such departure, will be displayed in all planning documents as part of the NEPA process. Departure from the guidelines does not mean that wildlife species will be eliminated, rather, it means that effects will occur. The greater the departure, the greater the effect.

Another requirement outlined in the Rocky Mountain Front Guidelines is a monitoring program of the Guidelines themselves to analyze the results of implementation and/or departure from the Guidelines. The Guidelines are based partially on wildlife monitoring information collected during the past seven years of studies and partially on available literature and the experience of the individuals who worked on formulating the Guidelines. Thus, an important consideration will be to test and validate the Guidelines as to their effectiveness. This can be accomplished by monitoring future activities for their effects on wildlife. Project activity monitoring is discussed in more detail in Chapter V.

2. Threatened and Endangered Species

Four species which are found or would have suitable habitat in the RM-1 Unit area have been listed by the US Fish and Wildlife Service as endangered or threatened. They are the grizzly bear (threatened), gray wolf (endangered), peregrine falcon (endangered) and bald eagle (endangered). The population characteristics and habitat requirements for these species are discussed in the following paragraphs. Detailed information is provided in the biological evaluation in Appendix F.

In accordance with the Endangered Species Act of 1973, as amended, as shown on the lease terms (Appendix A), the Forest Service will analyze the Chevron/Fina proposals and what effect they will have on Threatened and Endangered Species. There will be a biological evalution completed to determine if a "may effect" or a "no effect" will result for each of the listed species in the analysis area. If a "may effect" (the project will have some effect on the species or its habitat) determination is reached consultation with the US Fish and Wildlife Service will be conducted in order to determine if the "may effect" determination will result in a "jeopardy" situation (the project will jeopardize the exsistence of a listed species). If a "jeopardy" opinion is reached the proposal will have to be modified or denied.

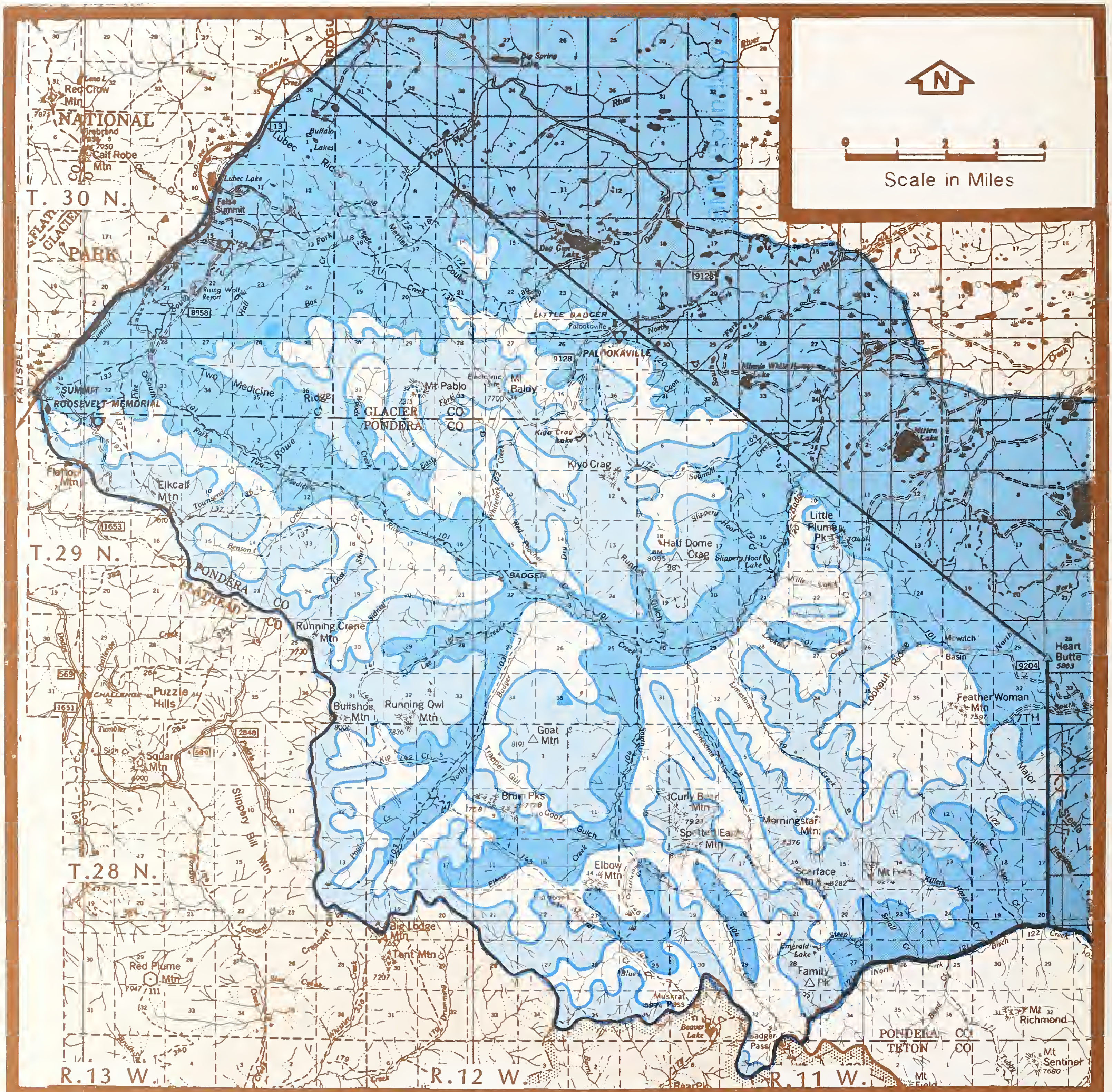
Grizzly Bear

Considerable grizzly bear research has been done on the Rocky Mountain Front during the period between 1960-1985 (Aune and others, 1985). The most recent research began in 1981 under the direction of Keith Aune (Montana Department of Fish, Wildlife, and Parks). Because of this research, much information has been gathered on home ranges (areas of yearlong use) and habitats (seasonal ranges, such as spring, summer, denning) for the grizzly bear on the Rocky Mountain Front. This includes information from radio-collared bears in the Badger-Two Medicine Roadless Area.

Based on this information, Bear Management Units (BMUs) were established for the Rocky Mountain Front. A BMU is the habitat necessary to support a subpopulation of female grizzly bears. The proposed projects are found within the Badger-Two Medicine BMU (Map 1.2). The land base in the Badger-Two Medicine BMU is just one of the BMU's that make up the Northern Continental Divide Ecosystem. All BMU's serve as a land base for the free interchange of grizzly bears within the ecosystem. Radio locations were used to establish use patterns by bears as well as to verify the location of the bear unit boundaries. This research indicates that migration between Glacier National Park, the Bob Marshall Wilderness Complex, the five remaining BMU's on the Rocky Mountain Front, and the Badger-Two Medicine BMU, does occur in spite of major highways and railroads that may lie within the ecosystem. Map 3.7 contains a habitat map displaying spring range and denning habitat. Additional information about the Badger-Two Medicine BMU is found in Appendix F.

Research also indicates that the bears using the Badger-Two Medicine BMU have smaller home ranges than the bears south of Birch Creek and that their home ranges are comparable to those of bears in the North and South Forks of the Flathead (Aune and others, 1986). Home ranges tend to be smaller in areas where food and cover is better. Based on this preliminary data, it appears that the Badger-Two Medicine BMU provides a higher quality habitat than the areas south of Birch Creek.

Recent studies have determined that current bear densities in the Badger-Two Medicine BMU are one grizzly per 16-20 square miles. Extrapolating this density to the size of the BMU indicates that approximately 16-20 grizzlies occupy the Badger-Two Medicine BMU (Dood et. al., 1986). This is comparable to the grizzly bear densities that have been established for other BMU's of the Northern Continental Divide Ecosystem but it is still less than similar BMU's to the west and in Glacier National Park that have similar habitats. Aune believes the current population is below the potential carrying capacity of the BMU (Aune, 1986, personel communication). However, the current population is approaching or has reached the populations defined in the Recovery Plan for grizzly bear in the Northern Continental Divide Ecosystem (US Fish and Wildlife Service, 1982).



LEGEND

🟦 Spring Habitat

▭ Denning Habitat

▲ Chevron Well Site Location

■ Fina Well Site Location

MAP 3.7

GRIZZLY BEAR SPRING RANGE AND DENNING HABITAT

Two critical times of the year for grizzly bear are spring when they emerge from their dens, and fall when they return to denning areas. Aune and others (1986) documented that the spring use season for the Badger-Two Medicine BMU begins after den emergence, which occurs throughout the month of April.

Movement from the den sites to the lower spring ranges occurs from late April to early May. Aune (1985) also states that data from 1980-85 indicates that all spring range is used during the breeding season and should be considered breeding areas. In the 1985 field season, breeding pairs were seen in the Elk Calf Mountain and the Two-Medicine Ridge-Hyde Creek areas. The Interagency RMF Guidelines recommend that human activities be avoided on spring ranges during the time period from April 1 - June 30. Thus, April through June are suggested timing restrictions on Table 3.3.

The denning period is another critical time for the grizzly bear in relation to disturbance. It has been recommended that human activities be restricted from October 15 - April 15 (BLM, 1987) in *key* denning habitat. As reported by Aune (1985), six den sites have been located in the Badger-Two Medicine BMU. Four of the sites are in the Benson Creek drainage above 6100 feet on northwest or southeast aspects in Alpine fir/Menziesii or Alpine fir, Engelmann spruce/whortleberry habitat types. The Benson Creek drainage is approximately 6 miles northeast of the proposed Chevron well site and 5 miles south of the proposed Fina well site. A den site was also located on the north side of Goat Mountain in a cave within 0.5 miles of the proposed Chevron well site, while another was located close to Emerald Lake which is approximately 7 miles southeast of the proposed Chevron site and 17 miles southeast of the proposed Fina site.

The Badger-Two Medicine BMU is accessed by a network of roads on the Blackfeet Indian Reservation and a combination of roads, trails, and old seismic roads on National Forest lands. Presently, all National Forest lands in the BMU are managed under the Lewis and Clark National Forest Travel Plan, which has area, trail, and road restrictions to motorized use designed to protect key wildlife habitats during key use seasons (Forest Service, 1988).

In the past, references have been made to the illegal taking of grizzly bears from the available access that exists in the Badger-Two Medicine BMU (Schallenberger, 1974). Grizzly bear mortality in the Northern Continental Divide Ecosystem is addressed at length in the Final Programmatic Environmental Impact Statement for the Grizzly Bear in Northwestern Montana (Montana Department of Fish, Wildlife and Parks, 1986). Of the 71 radio-collared grizzly bears that have been killed in the Northern Continental Divide Ecosystem over a ten year period, six of these were verified unreported deaths (i.e., the radio collars were found with no trace of the bear), and of these six, five were near roads.

Aune (1986) has documented the loss of grizzly bears in the Badger-Two Medicine BMU during the period 1977-1985. During that time, four bears have been lost from the Badger-Two Medicine BMU; one shot during a second relocation attempt of this bear to British Columbia, one by hunting, and two by illegal killing. During the spring-fall period of 1986, three bears were lost from the Badger-Two Medicine BMU; one during research action and two by illegal taking.

Gray Wolf

Most of the the Rocky Mountain Ranger District has been identified as suitable - occupied habitat for wolves. However, no denning or rendezvous sites have been identified on the RM-1 Unit. There is no evidence of pack activity, but it appears there are singular wolves passing through the RM-1 Unit while dispersing from a larger population in Canada or from the new pack that has established itself in the North Fork of the Flathead River. A small number of moose and elk make up the ungulate species that would serve as a prey base for the wolf (refer to section III.G.3 for more information on moose and elk).

Mattsen and Ream (1978) documented evidence of wolf presence in the Rocky Mountain Front area nearly a decade ago. At that time, populations for the Rocky Mountain Front were estimated at five to eight wolves. Wolf sightings in 1985 and 1986 compiled by the US Fish and Wildlife Service (1986 and 1987) reflect the presence of wolves several miles north of the RM-1 Unit on the east side of Glacier National Park and the adjacent Blackfeet Reservation (near Milk River, Cutbank Creek and Ridge, and Cutbank Ranger Station). In October 1985, wolf sightings near False Summit and Rising Wolf Mountain in Glacier Park were also recorded. This area is along the northwest boundary of the Badger-Two Medicine BMU.

A participant in the Wolf Ecology Project (Mattsen and Ream, 1987), stated that a wolf track and howling were documented in October 1985 on the west side of Goat Mountain (Fairchild, 1986, personal communication). Researchers from the Wolf Ecology Project completed limited surveys in the Badger Two-Medicine area the winter of 1986 and no wolf sign was found (Mattsen and Ream, 1987). In October of 1986, another survey was completed by the Wolf Ecology Project in which a total of 78 miles of roads and trails were hiked. No wolf presence was recorded.

A wolf pack of six animals did establish themselves on Blackfeet Reservation lands during the summer of 1987. The activity of this pack was located northeast of the RM-1 Unit. Because of the depredation by these wolves on livestock, this pack was controlled by the Animal and Plant Health Inspection Service (APHIS, USDA) which resulted in the taking of five of the six animals.

Bald Eagle

Bald eagles, although not known to winter in the BMU, migrate through the area in spring and fall. Migrants may be sighted near streams and rivers, ungulate concentration areas, and ground squirrel colonies.

Two known bald eagle nest sites are located on the Blackfeet Reservation; one in the East Glacier area, and the other along the South Fork Two-Medicine River. Tree stands along the South Fork Two-Medicine River in the BMU could be potential nesting sites for bald eagles, especially in two cottonwood stands close to Sawmill Flats. However, in eight separate trips by a recreation guard up and down the South Fork Two-Medicine River, there were no eagle sightings noted and none are known to nest on National Forest lands.

Peregrine Falcon

Scattered observations along the Rocky Mountain Front indicate use by peregrine falcons, at least by migrants, during spring and fall. Potholes, lakes, and riparian zones provide suitable habitat for prey species for the peregrine falcon. However, no active or historic nest sites (eyries) are known for peregrine falcons in the project area and no essential habitat is listed by the US Fish and Wildlife Service for the recovery of the peregrine in the Badger-Two Medicine BMU.

Two sites in the RM-1 Unit portion of the BMU have potential for sustaining eyries (nest sites); the cliffs that overlook Kiyo Crag Lake and the limestone cliffs that lie at the head of Whiterock Creek. However, after a survey of the Kiyo Craig Lake area by Forest Service personel in the summer of 1987, no activity by peregrines was seen.

3. Big Game Species

The Badger-Two Medicine BMU provides yearlong habitat for all of the big game species in Montana. The major big game populations that occur on the National Forest lands are elk, mountain goat, black and grizzly bear, and moose. Potential habitat exists for the pronghorn antelope, but this is limited to the plains and foothills on the Blackfeet Reservation. There are also limited populations of mule and whitetail deer over the entire BMU and a population of bighorn sheep which winter on Major Steel Backbone (a ridge system in the southeast corner of the RM-1 Unit) (Andryk, 1983).

Elk

The RM-1 Unit portion of the BMU provides yearlong habitat for 130-150 head of elk. The southern exposures along Badger Creek and the South Fork of the Two-Medicine River, and the Lubec Hills area provide winter range for the herd. Calving areas also exist in the vicinity of the Lubec Hills (Map 3.8).

The high elevation basins, aspen and subalpine fir, spruce lodgepole pine forests provide for excellent summer range. Schallenberger (1974) stated that 93 percent of the elk observed during the summer period were using the subalpine fir, bunchgrasses, and quaking aspen vegetation types. These summer range concentrations correspond quite closely with the burned areas of 1889. One segment of the elk population remains in the Hyde-Hall-Box drainages year round. They utilize the mosaics of open meadows, sidehill parks, lodgepole and aspen stands for forage and security cover.

Radio telemetry data indicates that there is movement of elk between Glacier National Park and the National Forest (Montana Department of Fish, Wildlife and Parks). The data indicates that the South Fork Two-Medicine River appears to be an important movement corridor between the Forest and the Park. The river also provides a movement corridor between elk winter range in the Lubec Hills, Hyde and Box Creek areas to the summering areas in the headwaters of the drainages that lie against the Continental Divide. The Two-Medicine Ridge, as well as other east/west trending ridges, are also used as major travel corridors.

Existing old seismic roads and trails in the Lubec Hills area, Palookaville, and the South Fork Two-Medicine River provide yearlong access into the area, either by vehicle, foot, horse or snowmobile. This traffic causes year-round disturbance to elk, especially in areas with less cover.

The elk population is considered to be below the potential carrying capacity of the land. Two causes for this reduced population appear to be: 1) year-round hunting that is practiced on the adjacent Blackfeet Reservation lands (Schallenberger 1974; BLM and Forest Service, 1985), which makes the winter range that is available there unusable; and 2) the illegal taking of elk on the National Forest lands. It has been determined that there has been a 60% percent illegal mortality of radio-collared elk in the Badger-Two Medicine BMU (Montana Department of Fish, Wildlife and Parks).

Moose

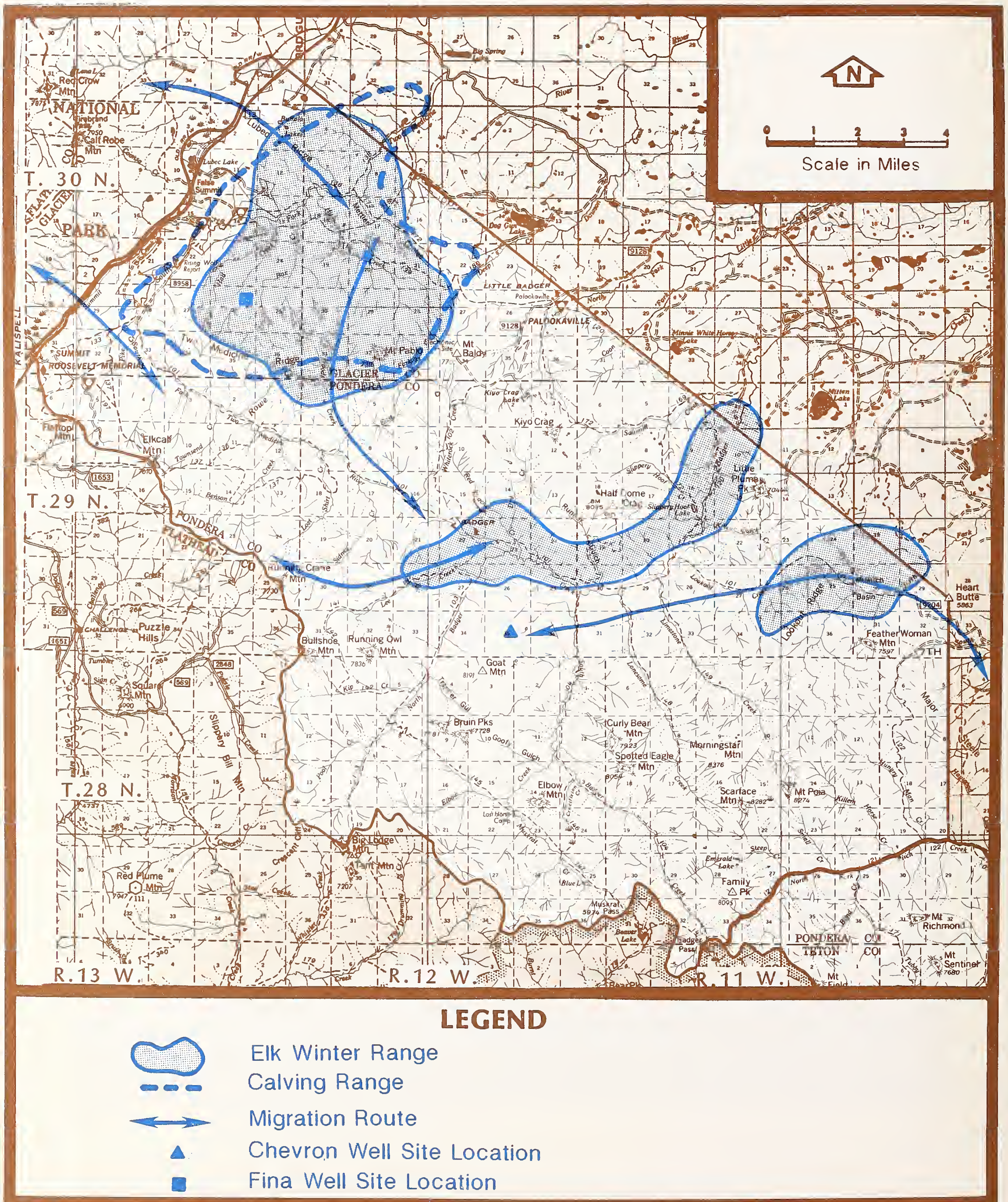
Moose are well distributed throughout a major portion of the South Fork Two Medicine River drainage and the North and South Forks of Badger Creek (Schallenberger, 1974). Population estimates vary from 10-30 individuals. These estimates are based upon tracks, pellet counts, and scattered observations (BLM and Forest Service, 1985).

Moose winter range is located in the willow and aspen bottoms of the South Fork Two Medicine River and Badger Creek. In addition, the variety of shrubs present (e.g. mountain maple, serviceberry, chokecherry, and willow) along the southern exposures of Badger Creek provide usable habitat.

A legal hunting season for moose was initiated in 1984 within the RM-1 Unit portion of the BMU. To date, three moose have been harvested legally in the area. Moose are also susceptible to poaching and harassment especially during the winter months. Uncontrolled access in the past and illegal harvest have kept moose populations much below the estimated carrying capacity (Bureau of Land Management and Forest Service, 1985).

Deer

The Badger-Two Medicine BMU provides summer range for white-tail deer and mule deer. Potential winter range exists along the main Badger Creek drainage below the junction of the North and South Forks of



MAP 3.8

ELK HABITAT

Badger Creek. Deer populations in the Badger-Two Medicine BMU, however, are very low. This is attributed to the year-round hunting practiced on the Blackfeet Reservation and the tendency of the deer to move onto the Reservation for winter range.

Rocky Mountain Goat

The Rocky Mountain goat is a yearlong inhabitant of the Badger-Two Medicine BMU. In 1981, a goat study was begun by the Montana Department of Fish, Wildlife, and Parks to determine the status of the goat, its seasonal ranges, and to develop guidelines to minimize the human disturbance to the population. These guidelines were incorporated into the Rocky Mountain Front Guidelines (BLM, 1987).

There are two areas of concern with regard to the Rocky Mountain goat habitat delineated In the Guidelines. The first is the high elevation areas associated with the Mount Pablo-Mount Baldy-Kiyo Crag-Half Dome Crag complex which is connected to the Curly Bear Mountain area via a narrow travel route across Badger Creek. The second area is the Goat Mountain-Bruin Peaks-Running Owl-Bullshoe Mountain area which is connected to the Goat Mountain-Curly Bear Mountain area (Appendix F). These areas are isolated from the main string of mountains along the Rocky Mountain Front and may provide a key travel corridor linking the interchange of goat populations of these two areas and the populations that lie to the south.

Map 3.9 shows the seasonal and yearlong ranges used by the goats. Summer and winter goat habitat is essentially the same, and is termed yearlong habitat. Joslin (1986) describes yearlong habitat as areas that range from 5,000 feet to 9,000 feet in elevation, on all aspects and slopes. Generally mountain goats are observed between 6,000-8,500 feet, on north, east and south exposures, on very steep glacial breaks (landtype 182), limestone rocklands (landtype 202) and high relief ridges and slopes (landtype 171). In summer, mountain goats can be seen on all vegetation types and terrain types, but in winter they tend to occur on crust, forest and parkland vegetation types, and cliff, talus, and ridge terrain types. In a seasonal habitat selection analysis, mountain goats selected seasonal habitats with physiographic features of slopes greater than 70 percent, elevations over 7,000 feet, aspects between northeast and southeast, and areas that are over one mile from an open road. Kidding and nursery areas occur generally on east to southeast exposures on slopes of 70 percent or greater and between 6,000-8,000 feet. Another important habitat requirement is salt licks. Goats use salt licks all year but the period from April to December appears to be a critical time. Along the Rocky Mountain Front, males tend to use the licks during May, June and early July while females use them after the kids are born in June and continue into September (Joslin, 1986).

Mountain goat populations are very vulnerable in accessible areas. The population in the Kiyo Crag area was greatly reduced since the 1950's by illegal hunting caused by the roaded access from Palookaville to Badger Guard Station (Schallenberger, 1974).

Mountain Goat habitat in the vicinity of the proposed Chevron well site is occupied yearlong and transitional habitat (Map 3.9). The nearest goat habitat to the proposed Fina well site is 2 miles to the southeast (Map 3.9).

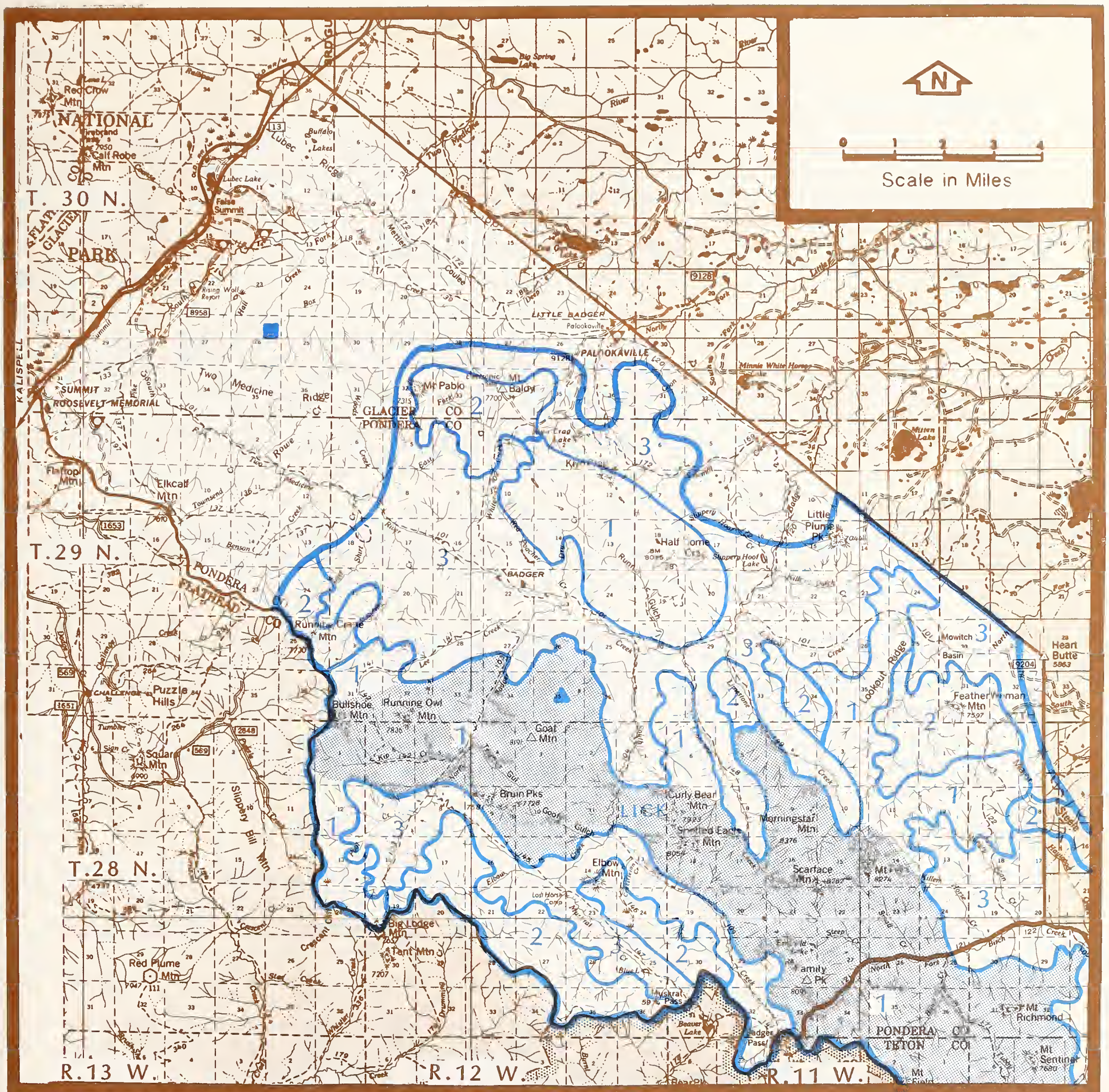
Bighorn Sheep

Major Steel Backbone (located three miles south of Heart Butte) is an elongated mountain used regularly by bighorn sheep. This area has been classified as winter range and has had documented use by radio collared sheep (Andryk, 1983). There have been other incidental sheep sitings on Mount Baldy (Schallenberger, 1974) and Whiterock Pass. These sheep may be dispersing from Glacier National Park.

Joslin (1986) has documented that the distribution of bighorn sheep overlaps with mountain goats that occur in the Birch Creek-Badger Creek area.

Gray Wolf

Rocky Mountain Goats



LEGEND

▬	Range of Habitat
LICK	Mineral Lick
▨	Breeding and Kidding Nursery Areas
1	Occupied Yearlong
2	Suitable Low Occupancy
3	Transitional
▲	Chevron Well Site Location
■	Fina Well Site Location

MAP 3.9

GOAT HABITAT

Black Bear

Distribution of black bears appears to resemble that of grizzly bears with black bear habitat present throughout the Badger-Two Medicine BMU (Aune et al., 1984). The low elevations and riparian zones are used as spring range (very similar to spring range used by grizzly bears) while the combined high and low elevation areas are used as summer range. Denning sites for the black bear are located from 4,500-7,400 feet in elevation. Black bear enter their dens from mid-October to mid-November and emerge late in March to the end of April.

The three most commonly used habitat components for all seasons are open timber, closed timber, and poplar stands. Timbered/burns are increasingly important from spring to fall. Key use areas for black bear appear to be along the upper reaches of the South Fork Two-Medicine River and Badger Creek as well as along the North Fork of Badger Creek (Aune and others, 1984; Aune and others, 1985).

4. Other Wildlife Species

Raptors

There has not been any survey completed for raptors. On a visit to the area, however, two potential nest sites were identified; one at Kiyo Crag Lake and one at the head of Whiterock Creek. A golden eagle was sited on the northwest side of Goat Mountain, but none were seen in and around the well site.

There is a stand of trees along the Whiterock Pass road that may serve as potential goshawk habitat. No goshawks were seen or heard during two trips through the area by Forest Service personnel, and after comparing the stand structure and location with nesting requirements (Hayward et al, 1985), this stand appears to rate fairly low on suitability.

The major riparian zones along the South Fork Two Medicine River and Badger Creek serve as nesting sites for owls.

Beaver

The headwaters of the Two Medicine River and Badger Creek comprise a considerable area being used by beaver. This area consists of excellent willow stands utilized for forage by beaver, as well as wintering moose. The aspen and cottonwood dispersed throughout the remainder of the drainages provide for beaver habitat.

Lynx/Bobcat

A study in northwestern Montana revealed that 90 percent of the radio locations of a male and female lynx occurred in thick stands of lodgepole pine created by the 1910 fires (Koehler and others, 1979). This is also where the snowshoe hare population, a lynx food source, was the most abundant.

The largest portion of the 1910 burns occurred in the South Fork Two Medicine River drainage (Schallenberger, 1974). As a result of past fire activity that has taken place in the RM-1 Unit, there is a variety in age classes and stand structure of lodgepole pine. Because of the quality of habitat that is present, it is assumed that a population of lynx and bobcat exists within the RM-1 Unit.

Wolverine

The wolverine utilizes large seasonal and yearly ranges in northwestern Montana (Hornocker, 1981) and is known to occur in the Badger-Two Medicine BMU. It has been listed in the Lewis and Clark National Forest Plan as a management indicator species (Forest Service, 1986a, p.2-37).

As determined by Hornocker (1981), wolverines utilize the mature or intermediate timber stands, especially when they are adjacent to cliffs, slides, patches of blowdown, basins, swamps, and meadows which serve as foraging areas for carrion or prey. They use the mature and intermediate timber stands for cover.

Wolverines are very susceptible to trapping because of their scavenging nature. They come readily to baits and are very vulnerable to skilled trappers. Hornocker (1981) believes that the populations in northwestern Montana have survived because of the vast expanses of wilderness and remote nonwilderness areas with very little intrusion by man. These areas have functioned as both refuge and reservoir for wolverine populations.

Mountain Grouse

All three species of mountain grouse (ruffed, spruce, and blue) reside within the Badger-Two Medicine BMU. Riparian zones provide habitat for the ruffed grouse, while timbered areas, grassland parks, and ridges provide habitat for the blue grouse, and timbered areas provide habitat for the spruce grouse. Whitetailed ptarmigan are present on some of the higher peaks.

Hunting of the grouse populations tends to concentrate on the north end of the area where there is more access. Elk hunters hunt grouse occasionally in association with their trips (Schallenberger, 1974).

Nongame

A host of non-game species are found in the Badger-Two Medicine BMU. These include reptiles, amphibians, birds and mammals. The Montana Department of Fish, Wildlife and Parks consider the following species, while not specifically studied, to be of special concern: Preble shrew, big-eared bat, hoary marmot, northern bog lemming, tailed frog, Dakota toad, harlequin duck, Cooper's hawk, pygmy owl, barred owl, great gray owl, long-eared owl, saw-shet owl, olive-sided flycatcher, western bluebird, clay-colored sparrow, and pileated woodpecker (Flath, 1984).

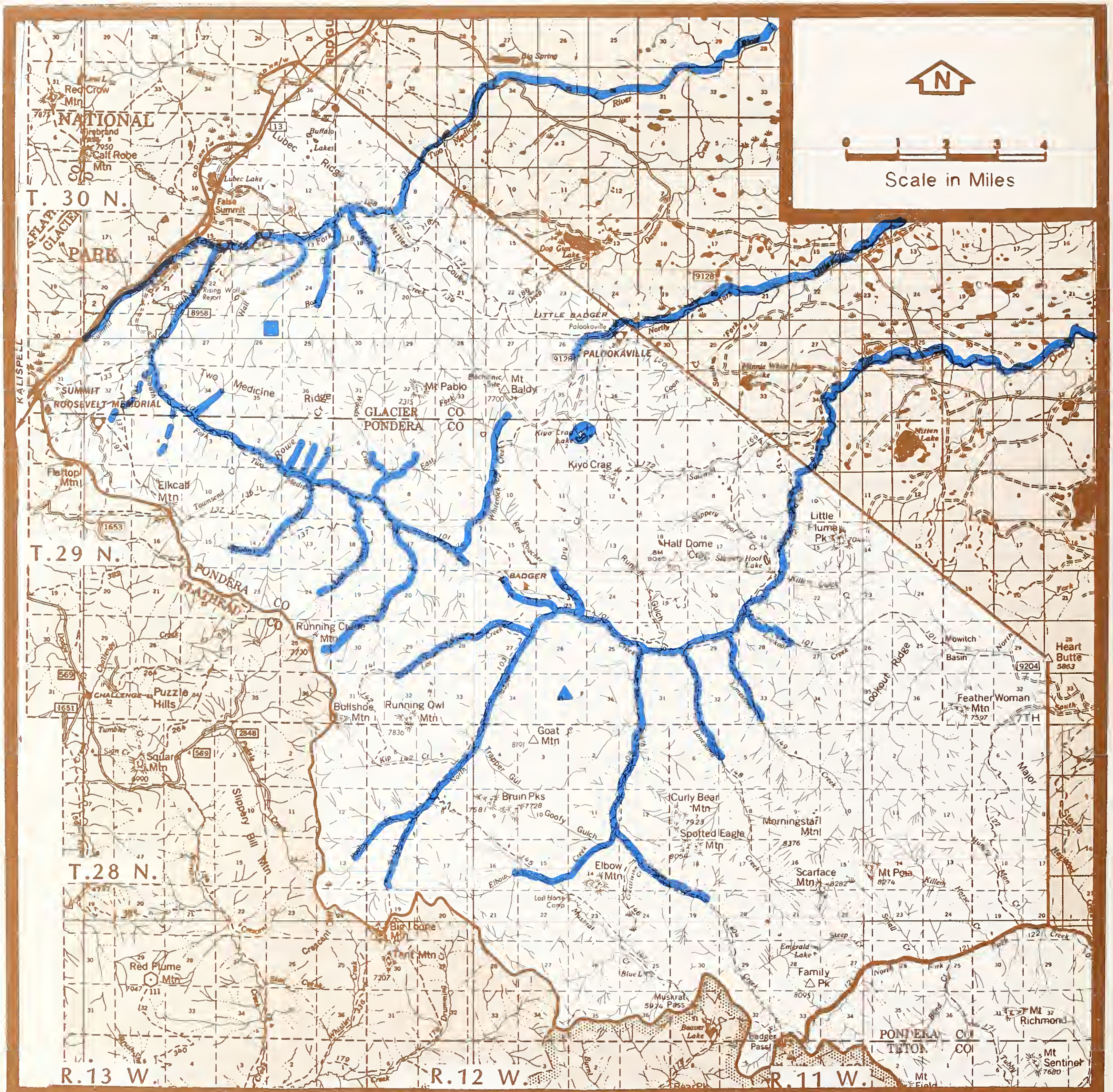
H. FISHERIES

This section documents population characteristics and habitat for fish species occurring within the RM-1 Unit. The fisheries analysis is not extended beyond the confines of the RM-1 Unit because neither changes in access patterns or water quality would be of a magnitude to result in any fishing effects farther downstream.

Population Characteristics

The South Fork Two Medicine River and the Badger Creek drainages contain approximately 75 miles of streams which support fish within the RM-1 Unit (Map 3.10). The only lake on Forest Service lands within the unit which supports fish is Kiyo Crag Lake near Palookaville. Game fish species which are present throughout the analysis area include westslope cutthroat (considered a species of special concern by the State of Montana and a sensitive species by the Forest Service), rainbow/cutthroat hybrids, rainbow trout, brook trout and mountain whitefish (Montana Department of Fish, Wildlife and Parks Surveys). The most prevalent nongame fish present in most streams is the mottled sculpin. Mountain and white suckers are present in Badger Creek on the Blackfeet Indian Reservation.

Genetic analysis of fish in the upper reaches of the South Fork Two Medicine River indicate that the fish are predominantly westslope cutthroat trout (97 percent) with a minor amount (3 percent) of rainbow trout influence. Downstream from Pike Creek , rainbow/cutthroat hybrids and rainbow trout are the predominant game fish. Analysis of fish from North Badger Creek and Lee Creek indicate that the populations are pure westslope cutthroat trout (Leary, 1986). Pool Creek also supports fish and, since it is in the North Badger



LEGEND

—	Known Fish Habitat
- - -	Suitable Habitat but no Fish
▲	Chevron Well Site Location
■	Fina Well Site Location

MAP 3.10 FISH HABITAT

Creek drainage, it likely contains pure westslope cutthroat trout as well. This population of westslope cutthroat is the largest confirmed population of pure westslope cutthroat trout found east of the Continental Divide. The abundance of trout in streams within the area varies with the amount and type of habitat available. Some streams support low numbers of trout 6 inches or longer in length, but contain abundant numbers of young of the year (born that year), and yearling fish. The abundance of trout and whether the stream is used as resident, rearing and/or spawning habitat is depicted in Table 3.4. Some of the streams in the South Fork Two Medicine drainage which contain numerous young of the year trout, are currently not classified by the Montana Department of Fish, Wildlife and Parks. These streams are depicted on Map 3.10.

Fishing pressure within the study area focuses on the South Fork Two Medicine River below Lost Shirt Creek and Badger Creek below the North and South Forks. Reliable estimates of fishing pressure for these reaches are not available (Hill, 1986, personal communication). Other streams within the area receive little, if any, fishing use. Most of the fish harvested in Badger Creek and the South Fork Two Medicine River are 9-13 inches in length with an occasional cutthroat of up to 18 inches in length being taken from Badger Creek (Hill, 1974-1986; Walch, 1984-1986). North Badger Creek and the upper reaches of the South Fork Two Medicine River have been found to support cutthroat mostly in the 7 to 13 inch size class, however, both streams support cutthroat up to 15 inches in length.

Habitat

Most streams within the RM-1 Unit were affected by major floods in 1964 and 1975. The South Fork Two Medicine River and North Badger Creek were heavily impacted. Most of the streamside willow cover was eliminated and is just now recovering. The elimination of the willow cover probably had a negative impact on the fish habitat in these drainages. Currently, most of the cover for catchable-size trout in these two streams is formed by turbulence associated with rock scour pools. Most of the tributaries have increased overhanging cover in the form of streamside willows and more diverse instream cover in the form of large woody debris, which forms pools and traps spawning gravels (Walch, 1987).

Natural barriers to fish movement are known to exist on several streams, including the North and South Forks of Badger Creek as well as Whiterock Creek, Pike Creek, and the unnamed tributary entering the South Fork Two Medicine River from the west about one mile upstream from Pike Creek. There are several rock outcrops that create barriers to fish movement on the South Fork Two Medicine River from Pike Creek upstream. Two of the outcrops create complete barriers to fish movement while two others within a mile upstream are partial barriers to fish movement. Barriers to fish movement were not found in the lower reaches of the other tributaries which contain fish. It appears that Pike Creek and the unnamed tributary one mile upstream from Pike Creek do not support fish above the barriers at the confluence with the South Fork Two Medicine River.

The current condition of the streambottom substrate for selected streams within the analysis area was determined from field evaluations (Walch, 1987) and is depicted in Table 3.4. Two aspects of streambottom condition, embeddedness and percentage fine sediment, give insight into the egg hatching success and overwinter survival of young of the year and yearling trout. Using existing models (Stowell et. al., 1983) and current substrate condition, egg hatching success in streams within the study area is expected to vary between 40 and 60 percent, while overwinter survival of young of the year and yearling trout is expected to range from 50 to 70 percent. Under optimum natural conditions, egg survival can approach 100 percent while overwinter survival ranges to 75 percent.

Given current fishing pressure and existing regulations, the current egg hatching success and overwinter survival of young of the year and yearling trout should be adequate to fully seed the existing habitat in the South Fork Two Medicine River and North Badger Creek with six inch trout. It appears that the factor which currently limits the number of catchable trout in the study area is the limited amount of quality pool habitat for adult fish (Walch, 1987).

Table 3.4
Fishery Habitat and Population Information on Selected Streams within the Study Area

Stream	FRVC[1] & Habitat Value[2] to Cutthroat Trout	Species[3]	Abundance[4]	Use[5]	Embeddedness	% Fine Sediment
Badger	2 (B)	wsct,rb,rb/ct, wf	200/mile	r,rr,s	-	-
N. Badger	1 (A)	wsct	250/mile	r,rr,s	29	29
Lee	1 (A)	wsct	60/mile	r,rr,s	35*	40*
Pool	6 (A)	wsct	-	-	-	-
S. Badger	2 (A)	eb,wsct	190/mile	r,rr,s	30*	30*
Badger Cabin Cr.	3 (B)	wsct	40/mile	r,rr,s	-	-
S. Fork Two Med River (upper) (lower)	 2 (A) 3 (B)	 wsct rb,wf,ct	 250/mile 300/mile	 r,rr,s r,rr,s	 29 33	 25 29
Pike	6 (P)	barren but contains good habitat	-	-	25*	25*
Townsend	3 (B)	wsct	**	**	**	**
Benson	3 (B)	wsct	100/mile	r,rr,s	30*	30*
Lost Shirt	3 (B)	wsct	50/mile	r,rr,s	25*	25*
Woods Cr	3 (B)	wsct	60/mile	r,rr,s	24	30*
Sidney	3 (B)	wsct	50/mile	r,rr,s	25*	25*
Whiterock (lower) (upper)	 3 (B) 3 (B)	 wsct wsct	 30/mile 60/mile	 r,rr,s r,rr,s	 80* 50*	 70* 49
N. Fork Little Badger	2 (A)	wsct	250/mile	r,rr,s	-	-

Table 3.4 (continued)

Stream	FRVC[1] & Habitat Value[2] to Cutthroat Trout	Species[3]	Abundance[4]	Use[5]	Embeddedness	% Fine Sediment
Summit Cr	3 (B)	wsct,eb,wf	125/mile	r,rr,s	-	-
Elbow Cr	4	eb	-	-	-	-
Railroad Cr	4	eb	125/mile	r,rr,s	-	-
Hall Cr	6	wsct,eb	50/mile	r,rr,s	30*	30*
Hyde	6	wsct	-	-	-	-
Box	6	wsct	-	-	-	-
Deep	6	wsct,eb	-	-	-	-

[1]FRVC = Fishery Resource Value Class, a State classification (Description as to how ratings arrived at is available at MDFW&P offices). Values range from 1 (highest valued fishery resource to 5 (limited fishery resource) and 6 (unclassified)

[2]Habitat Value to cutthroat trout:

A= Best habitat value
B= Substantial habitat value
C= Moderate habitat value
D= Limited habitat value and
P= Potential habitat if species introduced

[3]Species:

wsct=westslope cutthroat
ct/rb=cutthroat/rainbow hybrids
rb=rainbow
wf=mountain whitefish
eb=eastern brook trout

[4]Abundance: Denotes number of fish (over 6") per mile of stream.

[5]Use:
r=resident (yearlong use by adult fish)
rr=rearing (seasonal or yearlong use by young of the year or yearling fish)
s=spawning (used for spawning)

*Denotes visually estimated values. Other embeddedness and % fine measurements were measured quantitatively.

**Townsend Creek is reported to support westslope cutthroat trout, however, during 1986 field evaluations inadequate flow was present at the confluence with the S.Fork of the Two Medicine River to support a resident trout population.

I. VEGETATION

The subjects discussed in this section include a description of the potential natural vegetation, the current vegetation, plant species of special concern, noxious weeds, successional trends in vegetation, and livestock grazing, as related to the area of the RM-1 Unit. The Badger-Two Medicine BMU is used as the study are for the vegetation discussions because vegetation is related to home ranges and habitat for the grizzly bear.

Potential Natural Vegetation

The Badger-Two Medicine BMU varies from broad, rolling prairie grasslands at lower elevations on the east side, to dense, coniferous forests and alpine rocklands with increasing elevation to the west. The potential climax vegetation for this area is represented by a range of habitat types.

Grassland habitat types on the driest, most easterly and low elevation portions of the Badger-Two Medicine BMU are in the bluebunch wheatgrass series, including bluebunch wheatgrass/blue grama and bluebunch wheatgrass/western wheatgrass. With increasing elevation to the west the grasslands make a rapid transition to the rough fescue series habitat types, including rough fescue/bluebunch wheatgrass and rough fescue/Idaho fescue. Shrubby cinquefoil often shares dominance with rough fescue at climax in the foothills and mountain grasslands.

The lowest elevation forest habitat type is dominated by limber pine, rough fescue, and Idaho fescue in the limber pine/rough fescue habitat type. Stunted Douglas-fir trees are often common in this "pygmy forest" of the lower slopes and foothills of the Rocky Mountain Front. White spruce and/or Englemann spruce are often the climax dominant trees in the riparian zone along drainages in the foothills and mountains of the unit, characterized by spruce/horsetail and spruce/sweet-scented bedstraw habitat types. Riparian zones in the unit are more often dominated by cottonwood, aspen, willow and birch community types of undetermined successional status.

With increasing moisture on the mountain slopes of the unit, Douglas-fir and Subalpine fir are the dominant climax tree species. On lower mountain slopes, and mid-elevations on south and west exposures, Douglas-fir series habitat types dominate. Habitat type common in the Douglas-fir series forests include Douglas-fir/common juniper, Douglas-fir/snowberry, Douglas-fir/pinegrass and Douglas-fir/kinnikinnick. At higher elevations and on cooler and more moist mountain slopes sub-alpine fir series habitat types dominate. Common subalpine series habitat types include Subalpine fir/beargrass, subalpine fir/menziesia and subalpine fir/Sitka alder. Although less common, there are significant areas of subalpine fir/woodrush and Subalpine fir/grouse whortleberry habitat type present. Although more typical of forests west of the Continental Divide, the subalpine fir/queencup beadlily habitat type is represented in this unit.

At highest elevations near timberline, whitebark pine shares dominance with sub-alpine fir in the climax forests. Rockland and scree, with little vegetation, occur on significant land areas in the mountainous portions of the unit.

Current Vegetation

The above discussion of habitat type defines the vegetative potential of the land areas encompassing the entire Badger-Two Medicine BMU (Map 1.2). The vegetation currently present is a mosaic of vegetation types of various successional stages from early seral stages to Sub-climax and some representative climax stands. These vegetation types and their percent cover are listed as follows;

grassland and meadow	25%
coniferous forest with 40 to 100% crown cover	34%
coniferous forest with 10 to 40% crown cover	14%
aspen, cottonwood, and other forest types with less than 10% crown cover	5%
wet meadows, aquatic, and riparian vegetation	7%
rockland, talus and scree	14%
isolated alder, shrubfields and vegetated talus	1%

The major grass species are rough fescue, Idaho fescue, bluebunch wheatgrass, western wheatgrass, Richardson's needlegrass, western needlegrass, Kentucky bluegrass, timber oatgrass and junegrass. Lower elevation forests are dominated by limber pine, Douglas-fir, Rocky Mountain juniper, and common juniper. In moist, cool habitats along streams and mountain slopes, Englemann spruce, White spruce and aspen are common. With increasing elevation, lodgepole pine, subalpine fir, and white-bark pine become more important.

Important forb and shrub species in the Badger-Two Medicine BMU include cow parsnip, angelica, bluebells, false hellebore, horsetail and various willow species along streams and moist areas. Grassland forb and shrub species include lupine, balsamroot, sticky geranium, harebell, sugarbowl, shrubby cinquefoil, northern bedstraw, yarrow, fringed sagewort, and hairy golden aster. On the forested mountain slopes the more important forbs and shrubs are arnica, twinflower, Richardson's geranium, meadow-rue, clematis, tobacco-root, russet buffaloberry, spirea, snowberry, and various huckleberry species.

Plant Species of Special Concern

There are no known occurrences in the RM-1 Unit of plants classified as threatened or endangered under the Endangered Species Act of 1973. However, there are four known locations of sensitive plants and other plant species of special concern that occur in the RM-1 Unit, and one known location immediately adjacent to the RM-1 Unit. In addition, there are 21 plant species of special concern that may occur in the study area, based on general knowledge of available habitat. Because of their very limited distribution, these plants may be vulnerable to elimination by modification of relatively small areas of habitat. The list of plants of special concern that may occur on suitable habitat in the study area is found in Appendix H. This list should not be considered complete and is merely a statement of current knowledge. The list is a compilation of data from the Element Occurrence database of the Montana Natural Heritage Program (1987) and the Forest Service Northern Region Sensitive Plant Heritage Program (1988). Forest Service objectives for the management of sensitive plants and other plant species of special concern is: 1) implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions; and 2) maintain viable populations of all native plant species in habitats distributed throughout their geographic range on National Forest System lands. Direction in the Lewis and Clark National Forest Plan indicates that throughout the study area where these plants are found, special management will be applied as necessary to facilitate the continued existence of these plants in the habitats where they are located (Forest Service, 1986a, p.2-49).

Noxious Weeds

A weed is a plant that is growing outside of its desired location. The term "noxious weed" is a legal term, designated by State and County weed control laws. The following three noxious weeds have been identified as occurring within or adjacent to the RM-1 Unit portion of the BMU: leafy spurge, spotted knapweed and Canada thistle. These and other noxious weeds are rapidly spreading throughout the State of Montana and have a high probability of invading soil that is disturbed. Within the RM-1 Unit, special management guidelines for the prevention and control of noxious weeds have been developed. This direction is contained in the Lewis and Clark National Forest Noxious Weed Control Environmental Impact Statement (Forest Service, 1986c).

Successional Trends In Vegetation

Extensive wildfires during 1889 and 1910, and subsequent fires of lesser magnitude, opened up large areas of forested lands on the Rocky Mountain Front and the RM-1 Unit in particular. The resulting early successional grass/shrub vegetation produced a large forage base that supported significant livestock and big game use after 1910. Forest records show that between 1913 and 1940 the RM-1 Unit supported as many as 16,000 sheep and 350 cattle annually during the summer grazing season. In addition, some significant forage areas were reserved for big game use.

The past 80 years of fire control in the area has resulted in a rapid invasion and re-establishment of trees over much of the RM-1 Unit. This forest succession has reduced the grass/shrub vegetation and has resulted in a decline of the forage base for livestock and big game animals. Beginning in 1941, permitted sheep numbers began to decline as succession advanced and a shift toward cattle operations occurred. By the early 1970s, the continued decline in suitable range, coupled with an increased emphasis on reserving adequate forage in important wildlife habitats had resulted in a reduction of permitted livestock to their present level of one band of sheep (1,000 head) and 600 head of cattle for a two and a half month grazing season.

Tree encroachment into open areas, largely by lodgepole pine, continues at varying rates throughout the RM-1 Unit. The tree invasion accelerates in open areas as the tree height and density of adjacent stands progresses to a stage where they can offer protection from wind and modify the environment favorably for tree growth. This process is resulting in larger tracts supporting lodgepole pine forests and a shrinking forage base for wildlife and livestock.

Livestock Grazing

Forage is an important resource on the RM-1 Unit. Grasses, forbs, and shrubs provide forage for both wildlife and domestic grazing animals. Livestock grazing is a major use on about 15,000 acres of land suitable for grazing in the RM-1 Unit. Grazing occurs under paid permit to eight local ranchers who use the Forest as summer range to round out their cattle and sheep operations. This information is listed in Table 3.5.

Currently about 600 cattle and 1,000 sheep graze on the National Forest for about three months during the summer grazing season. Horses and mules used for saddle and packstock also graze on the Forest in connection with the outfitting and guiding business. Other miscellaneous livestock grazing results from public recreation use such as backcountry trail riding, and Forest Service administrative use.

Table 3.5
Livestock Grazing Within the Badger-Two Medicine Unit

Allot No.	Allotment Permittee Name	NF Total Acres	NF Suitable Acres	Livestock Kind	Livestock Number	Animal Unit Month
106	Heart Butte	6,124	772	Cattle	65	214
109	Lubec-Badger	20,447	9,417	Cattle	460	1,619
112	Little Badger	5,950	3,400	Sheep	1,000	600
114	Sawmill	5,877	1,278	Cattle	70	231
122	Palookaville	112	112	Horse	12	72
125	Badger Admin. Pasture	1,220	124	Horse	12	72
	TOTAL	39,730	15,103		1,619	2,808

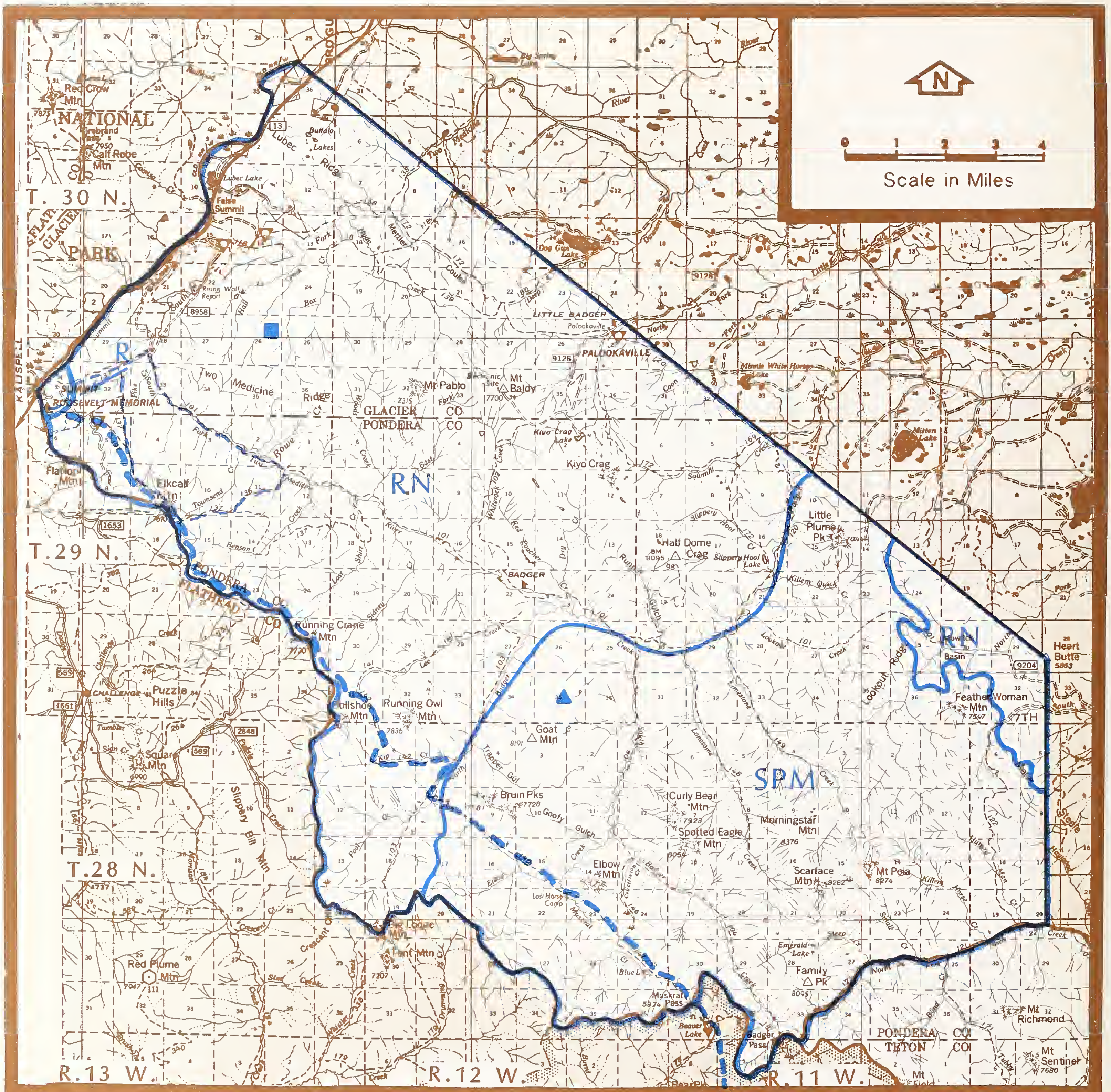
J. OUTDOOR RECREATION

The RM-1 Unit, commonly referred to as the Badger-Two Medicine area, provides a wide variety of recreation activities for local and regional users. The RM-1 Unit's size and juxtaposition with the Bob Marshall Wilderness Complex and Glacier National Park results in a large contiguous mass of land that is relatively free of human influence. Although the Unit is somewhat remote, it is accessible by motorized vehicles. Access is primarily provided from points along US Highway 2 on its northern boundary and to a lesser extent from county and private roads along its eastern boundary. A primitive road system, partially the result of seismic activity during the late 1950s and 1960s, is located within the Unit. Numerous trails designated for motorized and/or nonmotorized use are found throughout the RM-1 Unit. Human activity is primarily concentrated along travel corridors and along the exterior boundaries.

The RM-1 Unit is part of a larger physiographic area known as the Rocky Mountain Front. The Front is an abrupt transition between the North American Great Plains and the Rocky Mountains. As such, it provides a high diversity of wildlife and wildlife habitat and spectacular scenery. Views of Glacier National Park, wilderness areas and surrounding prairies and valleys can be seen from many of the peaks and ridges. Many people throughout North Central Montana are attracted by the outstanding hunting and backcountry experiences.

Recreation Use

Table 3.6 displays the major recreation activities and their comparative use. Most of this use occurs along the travel corridors comprising of trails and low standard roads (Map 3.5). Developed recreation sites in the area are limited to Summit Campground at Marias Pass, the Two Medicine Trailhead, and the horse unloading ramp along US Highway 2 (Map 3.11). Snowmobile routes originating at Marias Pass or along US Highway 2 and several major snowmobile routes and play areas located in the RM-1 Unit are a major winter use in the area. Most activity and use occurs along the South Fork Two Medicine River, Pike Creek, old seismograph roads, and the gas pipeline corridor that parallels US Highway 2. (Map 3.5.)



LEGEND

SPM Semi-Primitive Motorized
RA Roaded Natural Setting
R Rural
▲ Chevron Well Site Location
■ Fina Well Site Location

--- Two Medicine-Elk Calf Mountain National Recreation Trail
- - - Designated Continental Divide National Scenic Trail

MAP 3.11

EXISTING RECREATION OPPORTUNITY SETTINGS

Use conflicts do occur during summer and fall between people seeking more primitive recreation settings and opportunities (backpackers and hunters) and people using roads in the area (people using motorized vehicles on primitive roads and trails). Hunting is a major use in the RM-1 Unit. Most hunting activity is concentrated along the west side of the South Fork Two Medicine River. Two outfitter base camps are located in the area, one on the Two Medicine River at Townsend Creek and another along Badger Creek near Runner Gulch.

Recreation opportunity settings have been inventoried based on the guidelines outlined in the "Recreation Opportunity Spectrum Users Guide" (ROS user's guide) (Forest Service, 1982). Map 3.11 shows existing recreation opportunity settings in the RM-1 Unit. Approximately 60 percent of the area is presently classified (existing setting) as having a Roaded Natural setting or Semi-Primitive Motorized setting. The Roaded Natural and Semi-Primitive settings are described in the ROS User's Guide. The roaded natural area designation in the ROS User's Guide is designated as Management Areas E and G in the Forest Plan. The semi-primitive motorized designation in the ROS User's Guide is designated Management Area F in the Forest Plan. Characteristics and management prescription of Management Areas E, F, and G are found in Appendix C. As described, these areas are influenced by man's activities (US Highway 2, the Burlington Northern Railroad, and Forest roads and trails).

Table 3.6
Major Recreation Activities by Recreation Visitor Days (RVD's)* for RM-1
(Forest Service Recreation Inventory Management Data)

Activity	RVD'S	%
Hunting Big Game	5,720	23
Camping	4,430	18
Viewing Interpretive Exhibits	4,270	18
Snow Craft Travel	2,550	10
Motorcycle and Scooter Travel	1,650	7
Horseback	1,450	6
Picnicing	1,140	5
Gathering Forest Products (Firewood & Berries)	1,180	5
Hiking and Walking	1,210	5
Fishing	250	1
Cross Country Skiing and Snowshoeing	250	1
General Information (Signs)	140	1

* A ***Recreation Visitor-Day*** is defined as recreational use of National Forest sites, or areas of land or water, which aggregates 12 visitor-hours; this may consist of one person for 12 hours, 12 persons for 1 hour, or any equivalent combination of continuous or intermittent recreation use by individuals or groups. The RVD is the basic reporting unit in the Forest Service Recreation Inventory Management System (Forest Service, 1986).

National Recreation Trails

Two nationally significant trails systems are within or proposed for location within the RM-1. The Two Medicine-Elk Calf Mountain National Recreation Trail (NRT) is located in the northwestern portion of the study

View looking northward toward false summit and the US Highway 2-- Burlington Northern Transportation corridor. Mountains in the background are in Glacier National Park.

View looking northward from Marias Pass. In foreground is US Highway 2 and the Theodore Roosevelt Memorial. Mountains in the background are in Glacier National Park.

area. This nationally designated trail is a loop trail comprised of the Summit Cutoff Trail 133, Elk Calf Mountain Trail 137 and a portion of the Two Medicine Trail 101. The loop begins and ends at Summit Campground.

The designated Continental Divide National Scenic Trail crosses within the RM-1 Unit. The trail will overlap with several existing trails and will include new trail construction in the RM-1 Unit. Specific existing trails that are part of the Continental Divide National Scenic Trail include Elk Calf Mountain Trail 137, North Badger Creek Trail 103, Elbow Creek Trail 145, and Muskrat Creek Trail 147. Locational information for the Two Medicine-Elk Calf Mountain National Recreation Trail and the designated Continental Divide National Scenic Trail is found on Map 3.11.

Wild and Scenic Rivers

In 1988, the Lewis and Clark National Forest assessed the eligibility of all rivers within the proclaimed Forest boundaries for possible inclusion in the Wild and Scenic River System (Lewis and Clark National Forest Plan Amendment #2, 1989). According to the 1968 Wild and Scenic River Act, as amended, a river is eligible if it is free flowing and with its adjacent land area possess at least one "outstandingly remarkable" resource value.

Utilizing the Wild and Scenic River Act's two eligibility qualifications, an ID Team evaluated every river on the Forest. Nine rivers were determined eligible for further study as wild and scenic river candidates; two of these, North Badger Creek and North Fork Birch Creek, are located in the RM-1 Unit. North Badger Creek could be affected by Chevron's proposed drilling activity.

North Badger Creek is eligible for 7.3 miles from its upper boundary at the confluence with Pool Creek (T.28N., R.12W., Section 7) to its lower boundary at the falls (T.29N., R.12W., Section 25). North Badger Creek is noted for its outstandingly remarkable fisheries value. As an eligible river, North Badger Creek is assigned a potential classification of "Scenic" as defined by the Wild and Scenic River Act because an old road prism along North Badger Creek (Trail 103) remains intermittently visible and is managed for motorized use by all-terrain vehicles (ATV's) and snowmobiles (Lewis and Clark Forest Plan Amendment #2, 1989). The "Scenic" classification extends for its 7.3 mile length and for .25 miles in width from each bank of the creek.

The Wild and Scenic River Act, Section 10(a) states that eligible rivers shall be administered to protect and enhance their "outstandingly remarkable" values. Section (12b) clarifies that management and protection shall not abrogate any existing rights, privileges, or contracts affecting federal lands held by any private party. In order to manage and protect each eligible river for further study, Forest-wide management standards were developed to guide resource management activities within the river corridor until a river suitability study further evaluates and analyzes the river as required in the Wild and Scenic River Act, Sections 4(a) and 5 (c). The standards applicable to North Badger Creek under "Scenic" classification require that Chevron's proposed action be conducted in a manner that maintains the pure strain of cutthroat trout until a decision on wild and scenic classification is made.

The river suitability study will be conducted in the future as a separate study report or incoporated into the next Forest Plan/EIS revision.

K. VISUAL RESOURCES

Visual resources may be defined as ". . . the composite of basic terrain, geologic features, water features, vegetative patterns, and land uses that typify a land unit and influence the visual appeal the unit may have for visitors" (Forest Service, 1976). Management of the visual resource is based on visual quality objectives contained in the Forest Plan (Chapter 4). Visual quality objectives, define the degree of acceptable alternation of the landscape based on physical or sociological characteristics of an area (definitions for the visual quality ratings are included in Appendix I). Because the quality of a visual resource may change as prescribed activities take place, a project level visual analysis is required to identify and inventory specific visual objectives and opportunities in the project area and prescribe mitigation to meet the intent of the Forest Plan. This section documents the visual resource values of the area and summarizes the project level visual analysis. The visual resource inventory was based on procedures in the Visual Management System (Forest Service, 1974) and the Forest Service Manual (Chapter 2380).

The variety of the scenery within the northern portion of the RM-1 Unit, can be categorized as characteristic of the region south of Glacier National Park. The landforms are composed of ridges or rounded mountains which are not visually dominant compared to nearby scenery in Glacier National Park. Vegetation patterns are moderately varied with some natural openings. Moderate contrast is caused by seasonal color. Rock forms in the area add to the visual variety and are typically rock outcrops, cliffs, and talus slopes.

The present landscape features within the RM-1 Unit (either natural or man-made) are sub-dominate to the high elevation, and steep dissected peaks and ridges of Glacier National Park. Views of the Park command the attention of recreationists using the area.

Critical Viewpoints

Recreationists and travelers may have an opportunity to see portions of the access roads and well sites from the trails and transportation routes. Therefore, the project level analysis is based on viewing opportunities from the following travel routes; US Highway 2, Burlington Northern Railroad (Amtrac Route) which parallels US Highway 2, Autumn Creek Trail in Glacier National Park and the Elk Calf Mountain-Two Medicine National Recreation Trail. Five critical viewpoints are identified from the travel routes. Maps 3.12, 3.13, and 3.14 show the critical viewpoints identified and they are listed as follows:

Viewpoint A	-Opening in the vegetation along the Elk Calf Mountain-Two Medicine National Recreation Trail.
Viewpoint B	-Opening in the vegetation near the top of Elk Calf Mountain along the Elk Calf Mountain-Two Medicine National Recreation Trail.
Viewpoints C and D	-Critical points along US Highway 2, and the Amtrac Route.
Viewpoint F	-Critical point along the Autumn Creek Trail.

Project Level Analysis

Chevron APD

Views into the Chevron project area from US Highway 2 and the Amtrak Route are very limited. The foreground ridge screens views of the South Fork of the Two-Medicine drainage, and most of the proposed management activities. Some viewing opportunities exist at openings in the vegetation along the Elk Calf Mountain-Two Medicine National Recreation Trail.

Viewpoints A and B were selected as critical viewpoints because the majority of recreation use in the area occurs on the Elk Calf Mountain-Two Medicine National Recreation Trail. Critical viewpoints C, D, E, and F along US Highway 2, Amtrak Route and the Autumn Creek Trail are important, however, limited viewing from these viewpoints reduces their importance for this area.

Fina APD

Views into the Fina project area are visible from US Highway 2, the Amtrak Route, and the Autumn Creek Trail in Glacier National Park. Views from the Elk Calf Mountain-Two Medicine National Recreation Trail are quite limited.

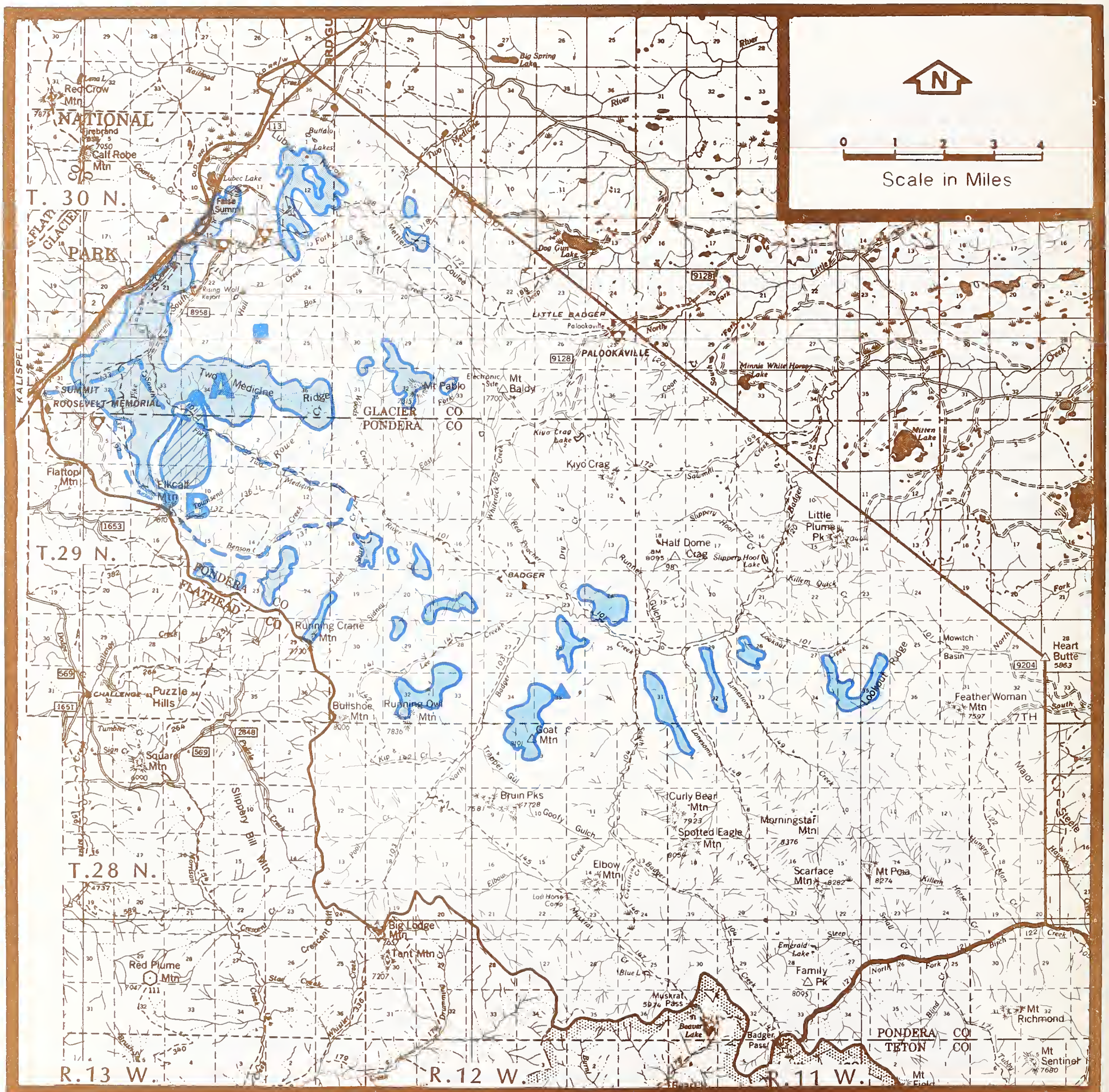
Viewpoints C, D, E, and F were selected as critical viewpoints because viewing into this area is critical from these locations. Viewpoints A and B are less critical due to screening provided by topography and vegetation.

Existing Visual Conditions

The inventory of the Existing Visual Condition denotes the visual change from the natural appearing landscape. To estimate the environmental effects of implementing alternatives, the landscapes predicted future visual condition is compared to the existing visual situation. Therefore, the existing visual condition inventory is the baseline for comparisons and serves as a historical record of the physical alternation. This inventory procedure is discussed in more detail in Appendix I.

The Existing Visual Condition of the transportation corridor containing US Highway 2 and the Amtrak Route, described as the foreground viewing zone, is rated as Class 4 - "Disturbed." Changes in this landscape are easily noticed by the average person and may attract some attention. This corridor, over Marias Pass, has been impacted due to development for the highway, railroad, utility lines and related facilities. Views into other portions of the project areas as seen from the previously mentioned critical viewpoints indicate an Existing Visual Condition of "Unnoticed" - Class 2. Class 2 areas are defined where changes in landscape are not visually evident to the average person unless pointed out.

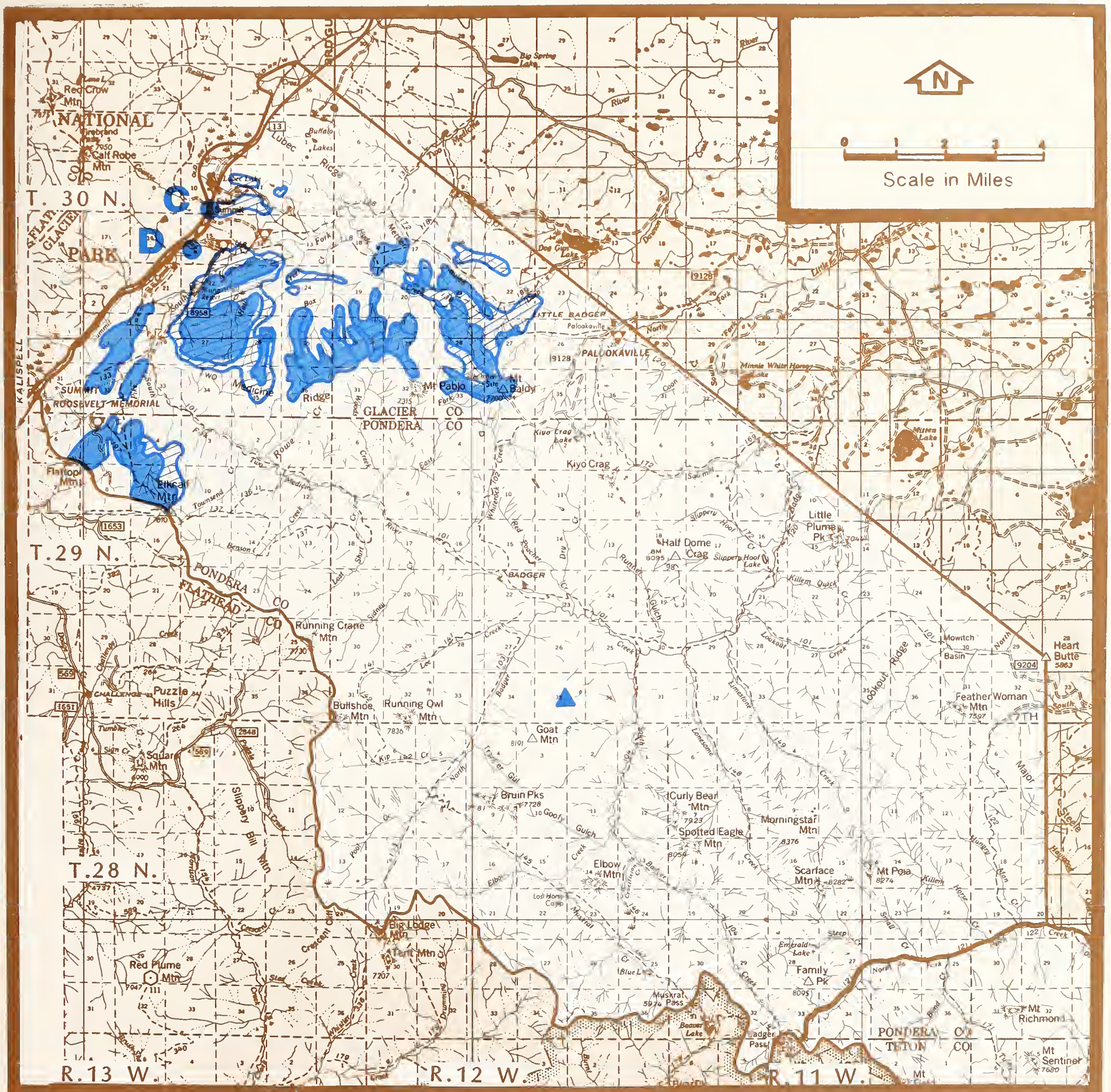
View into the RM-1 Unit from Autumn Creek Trail, Glacier National Park. Foreground vegetation screens most of the proposed oil and gas activity.



LEGEND

- ▨ Seen area from viewpoint A (5,160 Feet)
- ⬭ Seen area from viewpoint B (7,300 Feet)
- ▲ Chevron Well Site location
- ■ Fina Well Site Location
- – – Two Medicine-Elk Calf Mountain National Recreation Trail
- ● Viewpoint

MAP 3.12 SEEN AREAS FROM VIEWPOINTS A and B



LEGEND

● Seen Area from viewpoint C 5,080 Feet

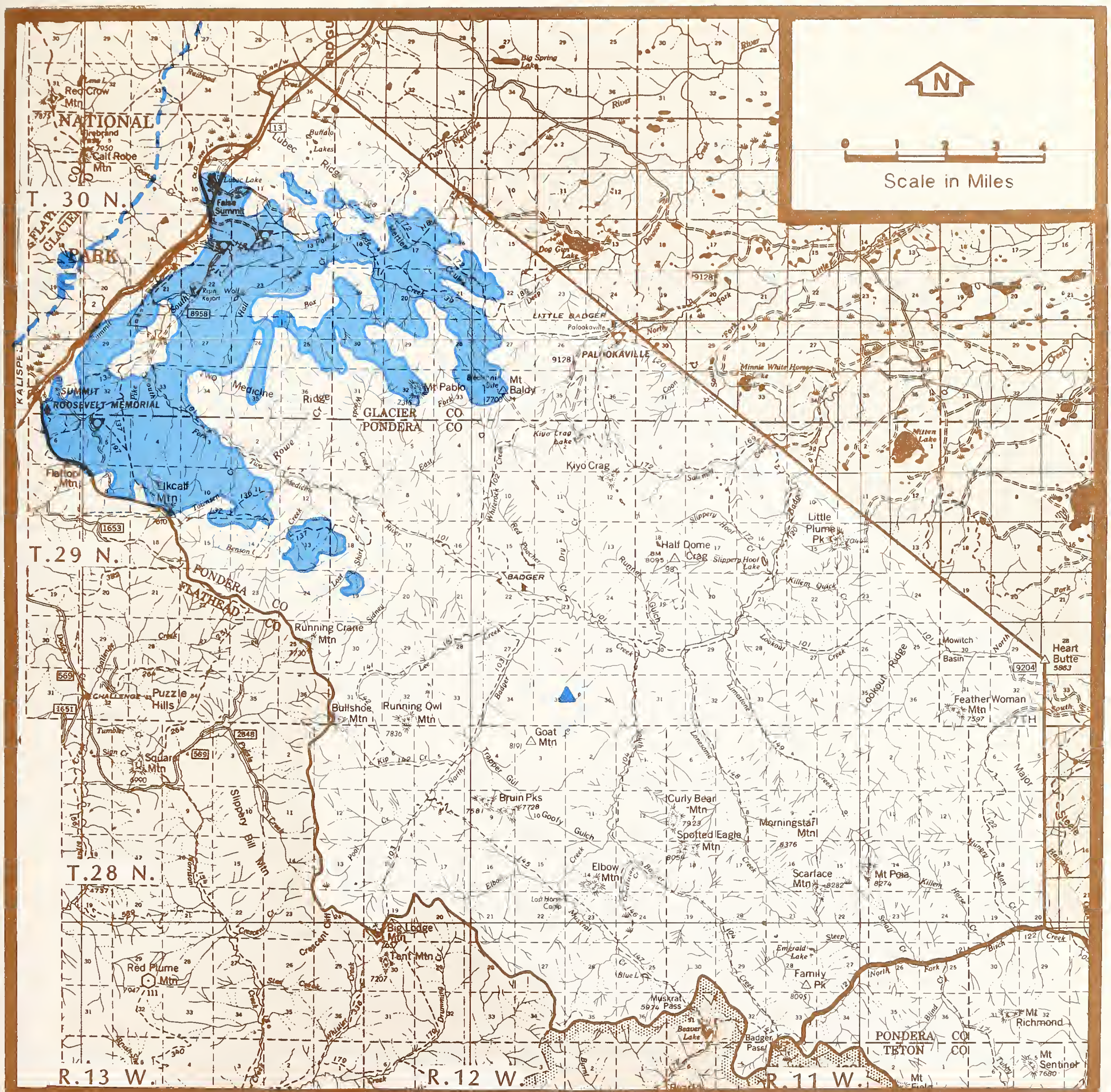
▨ Seen Area from viewpoint D 5,000 Feet

▲ Chevron Well Site Location

■ Fina Well Site Location

● Viewpoint

MAP 3.13 SEEN AREA FROM VIEWPOINTS C and D



LEGEND

Seen Area from viewpoint F	Autumn Creek Trail
▲ Chevron Well Site Location	● Viewpoint F Elevation 5,920 Feet
■ Fina Well Site Location	

MAP 3.14 SEEN AREA FROM VIEWPOINT F

Visual Quality Objective

As shown on Map 3.15, the area has project level Visual Quality Objective ratings of "Retention," "Partial Retention" and "Modification." The area adjacent to and in the foreground of US Highway 2 is rated "Retention." Management activities as seen from US Highway 2 and the Amtrak will have a large number of viewers and the sensitivity of those viewers will be high. A "Retention" Visual Quality Objective is appropriate for those foreground seen areas. The proposed drill site area for the Chevron project is not visible from the critical viewpoints. However, the proposed drill rig tower for the Fina project may be visible from some of the critical viewpoints. Areas visible from the critical viewpoints within the middle ground distance zone will have a "Partial Retention" Visual Quality Objective.

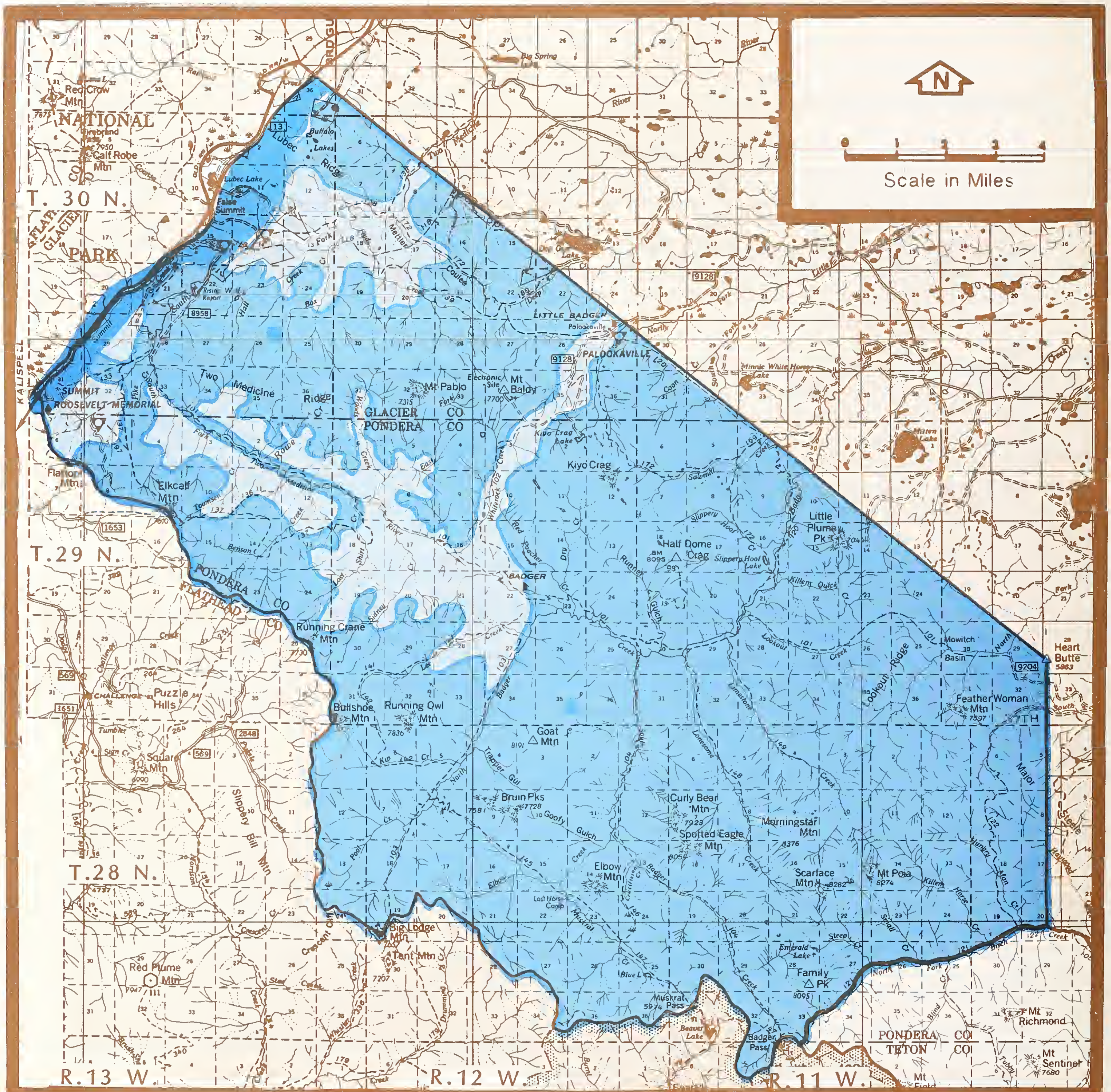
Viewing from the critical viewpoints within the Chevron area is very limited as are any proposed modifications within the Fina area. Design and location of access roads constructed within the foreground viewing zone from the highway and the railroad will be crucial in relation to meeting the Visual Quality Objective. Areas not seen from the critical viewpoints will receive a Visual Quality Objective of "Modification." As a consequence, the lower valleys of the area have a Visual Quality Objective of "Modification," and the upper ridges are assigned a Visual Quality Objective of "Partial Retention."

L. CULTURAL VALUES

This section describes cultural values pertaining to the RM-1 Unit and Federal responsibilities relating thereto. The discussion is organized into three sections: 1) history of traditional Blackfeet culture and traditional religion, including discussion of current issues relating to practice of traditional religion in the RM-1 Unit; 2) agency responsibilities and compliance with the American Indian Religious Freedom Act and protection of religious rights in accordance with the First Amendment to the Constitution; and, 3) a discussion of archaeological resources in the RM-1 Unit.

1. Blackfeet Indian Traditional Culture and Religion

This chapter provides background information regarding the traditional culture and religion of the Blackfeet Indians and their associations with the RM-1 Unit. This discussion will also serve to demonstrate compliance with the American Indian Religious Freedom Act of 1978 (AIRFA). Information for this section was obtained from both primary and secondary sources, including discussions from numerous meetings with the Blackfeet Cultural Committee General Working Group. This Working Group was formed expressly to discuss items of significance to Blackfeet traditionalists with various Federal agencies. The Lewis and Clark Forest served as the lead agency. Personal interviews were also conducted, mostly in conjunction with the Social Analysis for the Chevron Project Proposal (Hamlett and others, 1987). Blackfeet traditionalists, however, were not willing to discuss specific concerns and site locational information (even in a general sense), because of the sensitive nature of this information. Blackfeet traditionalists were reluctant to provide specific concerns, specific site locations, or particular spiritual undertakings.



LEGEND

🟦 Retention

🟦 Partial Retention

☐ Modification

▲ Chevron Well Site Location

■ Fina Well Site Location

MAP 3.15

VISUAL QUALITY OBJECTIVES

Because the Blackfeet have traditionally viewed religion to be an integral and all-pervading part of their life, it is difficult to actually separate religion from culture, or to present a discussion of "Blackfeet Religion." For the purposes of clarity and simplicity, the term "religion" will be used here, but will mean religion/culture/spirituality/tradition; the practitioners are referred to as "traditionalists."

History of Traditional Blackfeet Culture

The Blackfeet language is considered by many to be part of the Algonkian linguistic stock. Language similarities and some affiliations with material culture place the Blackfeet people as probably having once lived in the eastern woodlands, north of the Great Lakes. They migrated westward onto the Great Plains, and then eventually southward, east of the Rocky Mountains. The accounts of explorers, trappers and traders, and missionaries from the past 175 years most often cite the Blackfeet as living along the Saskatchewan and Missouri River systems.

The terms "Blackfoot" or "Blackfeet" were used by the first Euroamericans who travelled in the northern plains, to describe the three tribes or groups which comprised the Blackfeet confederacy. Northern-most were the "Northern Blackfeet," with the "Bloods" in present-day southern Alberta, and a southern group located in present-day Montana, called the "Piegan" (or "Pikuni"). This report shall concentrate on the Piegan group and refer to them as they presently refer to themselves: Blackfeet. The Northern Blackfeet, Bloods, and Piegans all lived and travelled within smaller political and economic units, called "bands."

The Blackfeet people supported a relatively large population throughout most of its history. In 1832, artist George Catlin estimated the Blackfeet to number 16,500. Prince Maximilian estimated 18,000 to 20,000 people in 1833 (Ewers, 1958). Isaac Stevens, trying to enjoin the Blackfeet for the 1855 Treaty Council, estimated that "they number above ten thousand souls" (Records of the BIA, 1951). Catastrophies, such as the smallpox epidemics of 1781, 1837, 1869-1870, periods of starvation, and violent battles with other tribes caused great fluctuations in their numbers.

Until being placed on the reservation, the Blackfeet were hunters and gatherers, their culture being based on a hunting and gathering economy. Bison were central to their well-being. Almost every part of the bison was utilized for a wide variety of purposes, including food, clothing, shelter and tools. Prior to the introduction of horses in the Eighteenth century, travel was done on foot, and dogs were used as beasts of burden. The introduction of horses aided mobility and also expedited the pursuit of food. By the time the first Euroamerican explorer lived with the Blackfeet (David Thompson, 1787 to 1788), they had had guns and horses for at least 50 years (McFee, 1972), and were living a lifestyle similar to the popularized ideal depicted in western movies and books.

The family was (and is) an important unit, socially and economically, to the Blackfeet. The band was the basic economic and political unit. Bands would join together at certain times of the year for economic, political, and spiritual pursuits, usually in the summer months. There were also a number of other types of organizations, including warrior societies, religious societies, and dance associations. "Generosity was a major requisite for prestige and status" ... "generosity, bravery, wisdom, and skill were highly valued personal qualities" (McFee, 1972).

As mentioned previously, religion was practiced on a daily basis and pertained to all aspects of life. Blackfeet religion possesses a number of dimensions. "Napi" or "Old Man" was the "chief god" (Grinnell, 1892). Grinnell translates the term to mean the first light of morning, or "light personified," though states that most people regarded "Napi" to be a real man. The Sun also figured importantly, and was "the supreme chief of the world" (Grinnell, 1892).

The Medicine Lodge, in which the Sun Dance was held, was constructed in reverence for the Sun. The Sun Dance was held during the summer and was a major tribal religious ceremony. Vision quests were made by men; after fasting and praying by one's self, supernatural power often was bestowed upon them. Sacred bundles and pipes were used and highly regarded. Many other spirits and powers, from the sky, the water, and the land, figured importantly in Blackfeet religion.

Christianity was introduced to the Blackfeet by Catholic priest P.J. DeSmet. DeSmet visited the Blackfeet in 1846, and Father Nicholas Point wintered with the Blackfeet during the winter of 1846 to 1847. The first permanent mission, St. Peter's, was established about 1859. Although Protestant missionaries visited the Blackfeet, the first permanent Protestant mission wasn't established until 1893.

Although the Blackfeet had a close affinity to the land, and surely preferred certain locations over others, they were traditionally a nomadic people who moved throughout a vast area. They hunted bison and other animals and gathered plants through a territory which was loosely defined as theirs. As increasing numbers of Euroamericans travelled westward, however, differences emerged between the American Indian perspective of land use and ownership and the prevailing Euroamerican perspective. Euroamericans wanted to mine available precious and valuable minerals and to start settling in some areas. Communication and travel networks began to spring up. Some of the vast Blackfeet lands were needed to accomodate these changes.

The first treaty which affected Blackfeet territory was the Fort Laramie Treaty of 1851. Although no Blackfeet were present when this Treaty was drawn up, the U.S. government set the territorial boundaries for those Blackfeet within the United States to correspond to about the central two-thirds of present day Montana. In the Stevens Treaty of 1855, the Blackfeet ceded lands south and east of Hell Gate Pass (Missoula) to the Musselshell River headwaters to be used as common hunting grounds for a number of tribes. An 1873 Executive Order moved the southern boundary of Blackfeet territory to the Missouri and Sun Rivers and the eastern boundary to the North Dakota line. An act was passed in 1874 to establish reservations for Indians in Montana Territory. Additional Executive Orders (1874, 1875, and 1880) further changed the Blackfeet territory. An agreement was signed by the Blackfeet and ratified by Congress in 1888 which eliminated lands east of present-day Cut Bank and established the Blackfeet reservation similar to what it is today.

One additional change was made in 1895 (ratified by Congress in 1896): a strip of about 400,000 acres along the east slope of the Rockies was ceded to the government in 1895. A large portion of this ceded land comprises that portion of Glacier National Park east of the Continental Divide, with the remaining 130,000 acres in the Lewis and Clark National Forest. The RM-1 Unit corresponds to the National Forest piece of 1896 ceded land. The Blackfeet reserved certain rights in the ceded area in the 1896 agreement. These are listed in the following section on Blackfeet treaty rights.

The traditional lifestyle of the Blackfeet drew to an end during the 1870's and 1880's. In addition to land use pressures, the bison herds which the Blackfeet heavily depended upon were decimated. Starvation and disease caused the death of almost one-quarter of the Piegans from 1883-1884 (Ewers, 1958; Schultz, undated). The entirety of Blackfeet life, their culture, economy, practice of religion, and subsistence underwent major changes. American Indians as a whole were forced into a period of dependency on the Federal Government. This continued for about the next fifty years, until the Indian Reorganization Act of 1934 allowed for some independence and self-determination.

In their push to assimilate Indians into the mainstream of Euroamerican culture, Indian agents, under the guise of the Federal Government, discouraged the practice of Indian ways. Children were removed from their families and placed in missionary schools. There they were forbidden to speak the Blackfeet language and were required to cut their hair and wear white-man's clothes. Dancing and singing, curing rituals, and other religious activities were first discouraged and then forbidden. Some individuals embraced the new ways and became devout Christians. Some, however, were not willing to relinquish their traditional ways and religion. These practices went "underground." Some aspects of the traditional religion were lost, however, as practice and familiarity waned. The powers of the sacred bundles were not always transferred, and these bundles lost their power. The piercing in the Sun Dance was prohibited in about 1891 for the Piegans, although the Bloods practiced it for about 20 more years (Ewers, 1968).

The religion itself never totally died out. Many middle-aged and older people recall attending ceremonies as children with their parents and grandparents. Despite efforts against this, a number of people were raised with the traditional religion. Many of these people are helping to guide the revitalization of traditional Blackfeet religion.

During recent years, the Blackfeet people have witnessed a renewed interest in their traditional ways, and also in their traditional religion. Increasing numbers of people, especially younger people, have turned to the older traditionalists to learn and be trained in the religion. In fact, some of the younger people are becoming recognized as religious leaders.

Practice of Traditional Culture and Religion and the RM-1 Unit

Blackfeet traditionalists, as a group, have raised a number of concerns regarding the practice of traditional religion and Forest Service management in the RM-1 Unit, particularly the approval of exploratory drilling. The RM-1 Unit possesses characteristics which are considered important for the practice of traditional culture and religion. Religious practitioners value the area's clean air and water, the limited access which affords less chance of disturbance, and the beauty of the relatively undisturbed environment. Some forms of traditional religion have been practiced in the RM-1 Unit. Traditionalists hold the opinion that oil and gas exploration would cause major disturbance to the quiet and solitude necessary to the practice of certain aspects of Blackfeet religion, particularly fasts or vision quests. They view the entire RM-1 Unit and all aspects of the land as having religious importance, including the plants, the rocks, the trees. They feel that if one part of the RM-1 Unit is impacted, it will affect other parts. The traditionalists also hold that exploration would cause the spirits which inhabit the area to permanently leave.

Another concern which traditionalists have for the RM-1 Unit is that they are beginning to use the area to help acquaint people who have drug and alcohol problems with traditional customs and religion. Many feel that increased access, which they believe would be afforded by oil and gas exploration, would not be compatible with traditional practices. They believe that one of the reasons that the RM-1 Unit has remained so "clean" is because of the lack of access presently available.

The traditionalists are also concerned that this generation and future generations will not have future opportunities to practice religion in an undisturbed environment. Some feel as though they "have their backs against the wall," that this is the last place where they can experience peace and solitude. These people thus feel that any type of development-related activities should be disallowed so that the area can be set aside to use in the future.

Although contemporary use of the RM-1 Unit for religious purposes is known and future use projected, historical use of the area cannot be readily documented. Perusal of some of the major early written accounts (journals and letters of explorers, trappers, traders, government offficials, missionaries) did not yield any mention of use of the Rocky Mountain Front, other than an occasional mention of individuals hunting. There was reference made of religious use in other geographical areas, such as the Sweetgrass Hills. Of course, since traditional religion is generally of a personal and individual nature, it is questionable whether an individual would mention to a Euroamerican that he was going to the mountains for religious purposes, and thus be reflected in the written record. Also, as stated in the following section, there is only little prehistoric use recorded within the Chevron project area.

Some of the mountains and creeks in the RM-1 Unit, particularly in the southeastern portion, are named after Blackfeet supernatural figures, important in Blackfeet tradition and cosmology. The Blackfeet believe that the physical area can take on or assume spiritualness from its name.

It cannot be determined what type of religious activities would have occurred in the RM-1 Unit. It seems probable that Sun Dances were not held in the rugged mountain environs, since bands gathered together for the Sun Dance and an area would be needed which could support the encampment of a large number

Blackfeet elders

Dedication of Theodore Roosevelt Memorial Obelisk
on US Highway 2, August 1931

of people. Individual pursuits, such as vision quests, or those with small groups seem more feasible for the mountains.

As a part of this discussion, it should be noted that the Lewis and Clark Forest has received some letters and comments from Blackfeet people who take issue with the traditionalists' stand. There are some Blackfeet people who do not believe that there was historical use of the RM-1 Unit for religious purposes, and that religious practices in the area have only been initiated within the past few years as a form of opposition to oil and gas exploration.

2. Agency Responsibilities and Compliance with American Indian Religious Freedom Act and Protection of Religious Rights In Accordance with the First Amendment

The American Indian Religious Freedom Act (AIRFA) provides:

> On and after August 11, 1978 it shall be the policy of the United States to protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians, including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites. 42 U.S.C. 1966 (1982).

Court cases establish that the AIRFA imposes a duty on federal agencies to "evaluate their policies and procedures with the aim of protecting Indian religious freedoms" Hopi Indian Tribes v. Block, 8 ILR 3073, 3076 (D.D.C. June 15, 1981). The duty to evaluate normally requires that agencies learn about Indian religious practices, consult with Indian leaders and religious practitioners, and consider any adverse impacts on Indian religious practices in their decision making process. According to the United States Supreme Court in Lyng et. al. v. Northwest Indian Cemetary Protective Association et. al., 1988 (No. 86-1013), if it can be demonstrated that the Forest Service (or other agency) made a good faith effort to consult with the affected groups and applied appropriate mitigation measures to resolve religious concerns, AIRFA compliance is satisfied, and a project determined to be in the best interest of the American people can proceed.

The Lewis and Clark Forest has been working with the Blackfeet Tribe since the inception of this analysis. Forest Service personnel have corresponded with, informed and met with the Blackfeet Tribal Council and with a loosely organized group of traditionalists. A general working group, open for participation, was established and the Blackfeet people designated the persons to participate in this group. This group met informally, at night, in an individuals home, during the winter months because it was desired by the Blackfeet Traditionalists. Several meetings had no other agenda than to discuss Blackfeet cultural concerns, particularly with respect to proposed Forest Service activities. Some meetings featured guest speakers, among them a range conservationist who discussed wild plants and Blackfeet concerns for gathering them, the Lewis and Clark Forest Recreation staff officer who discussed wilderness designation, an EIS Interdisciplinary Team (IDT) Leader who updated the group on the EIS study progress, and the Chevron coordinator for the Badger APD who listened and responded to the Traditionalists concerns. Formal meetings were also held to update the Traditionalists on the status of the EIS, and to allow review and comment of the cultural sections of the EIS. In addition to the Forest Archaeologist's participation, the group had cultural/archaeology specialist representation from the Bureau of Land Management, National Park Service, and Flathead National Forest. The project ID Team leader, Forest Recreation Staff Officer and Forest Supervisor also participated in these formal meetings. The Forest Service has made a continuing effort to keep the Blackfeet Traditionalists informed of the progress and status of the EIS.

In addition to the coordination and consultation with the Tribe by Forest Service personnel, the Lewis and Clark Forest also contracted with a qualified ethnologist to conduct an independent study of traditional use of the RM-1 Unit by the Blackfeet, concentrating on possible religious use. This report is incorporated by reference, and a summary of the report is included as Appendix M.

Tribal consultation is discussed in more detail in Chapter VII.C.-Consultation with Other Agencies.

3. Archaeological Resources

Intensive archaeological study in the overall RM-1 Unit and adjacent areas has been limited. It is therefore problematic to compile background data into a general overview for the area's prehistory. Studies for the specific project areas have been substantial, however. These studies have met compliance with the National Historic Preservation Act (1966) and other applicable cultural resource legislation and regulations.

The National Historic Preservation Act and other legislation pertaining to cultural resources provide for consideration of the resource through identification, significance determination and management of the cultural resources. If an archaeological site is found during a pre-disturbance cultural inventory, a Determination of Eligibility for the National Register of Historic Places would be pursued. This determines a site's significance and involves application of Federal criteria (36 CFR 60.4) and consultation with the State Historic Preservation Office and the National Register of Historic Places. If a site is encountered during project construction activities, land disturbance in the site vicinity would be halted until site eligibility has been determined and applicable measures and consultation completed. If the site is determined ineligible, the project can proceed without conflict to the cultural resource. If the site is determined eligible, the Forest Service would develop management recommendations and mitigation measures and proceed with the consultation process as outlined in the National Historic Preservation Act. This consultation process involves the State Historic Preservation Office and the Advisory Council on Historic Preservation. Mitigation may involve project avoidance of the cultural site if, during project construction, an archaeological site is exposed. The projects would be relocated outside of the area encompassing the archaeological site. If relocation involved moving the project outside of an area that has had cultural inventory, an additional cultural inventory and environmental analysis would be conducted..

A number of archaeological inventories have been conducted in the Chevron and Fina project areas. These inventories include the Lower Pike Timber Sale (Manning, 1982), Hall Creek Prescribed Burn (Fairchild, 1985), Hall Creek APD Environmental Assessment (Greiser and Plochman, 1983; Greiser, 1984; Greiser and Quigg, 1985), Badger Federal APD (Senulis, 1986a and 1986b), field visit to site 24GL57 (Hamlett, 1987), and Chevron/Fina EIS Alternatives and Drillsites (Hamlett, 1988). In addition, the Forest Archaeologist has conducted studies in the project areas on at least four other occasions. Fredlund and Fredlund (1971) conducted a study along the Middle and South Forks of the Flathead River. They also considered areas in the nearby Continental Divide and subalpine zone.

Studies indicate that Marias Pass was used as a travel route through the mountains, crossing the Continental Divide from the mountains onto the open plains. The plains were a traditional bison hunting area while mountain passes were traditional travel corridors. Travel through the mountains could have been along several routes. Badger Creek, which connects with the broad, mile wide glacial valley of the South Fork Two Medicine River is one possible travel route. This area is relatively open and without physical barriers or hardships that could have prohibited travel on foot or horseback. Fredlund and Fredlund (1971) also found more sites on ridge tops than along river bottoms; this may hold true for the South Fork Two Medicine valley.

It is believed that the type of archaeological sites which could be found in the project areas would be relatively small and relating to activities of a temporary, transitory nature. It is doubtful whether anyone would have wintered in this environment with its great snowfall, cold temperatures, and lack of openness. Also, it does not seem likely that the project areas' environs would have hosted a large number of people at one time. A large encampment would need a spectrum of resources that are not readily available in the upper South Fork Two Medicine country. It is reasonable to conclude that prehistoric use of the area may well have been limited to small-sized groups of people and was of a transitory nature such as small hunting parties, people travelling across the mountains, or with individual pursuits, e.g. for religious purposes.

A sample archaeological inventory of the Chevron project area was performed by Senco-Phenix, an archaeological consulting company working under contract to Chevron, U.S.A. and permitted on the Lewis and Clark National Forest. The first phase of this inventory was conducted in July 1986 and involved survey of the alternative access road which leads from Badger Cabin to the drill site area (Maps 2.1, 2.2, and 2.3). The second phase of inventory was conducted in October, 1986 and involved survey of the South Fork Two Medicine valley bottom, which includes access roads for six alternatives (Maps 2.1, 2.2, and 2.3). Buster Yellow Kidney, an officially recognized traditional and religious leader of the Blackfeet, was also contracted by Chevron to accompany the archaeologists for consultation regarding traditional cultural and religious values and actual sites. The Lewis and Clark National Forest Archaeologist also participated in this survey. Neither of these Senco-Phenix surveys yielded any cultural sites (historic or prehistoric). While providing information of a generalized nature about potential archaeological resources in the Chevron project area, neither of these surveys is regarded as being "intensive" or "sufficient" to provide compliance with cultural resource legislation for specific project activities such as road construction or well site construction. Therefore, if the Chevron APD is approved, an intensive survey of the selected access alternative and well site will be neccessary. One historic site was recorded outside of the project area during this phase.

Senco-Phenix determined the Chevron project area to generally have a low probability for the occurrence of cultural materials. Factors contributing to this determination include, in the well site area, a steep northwest slope and very dense vegetative cover. Low probability factors for the road corridors include a lack of prehistoric and historic remains, and a greater probability for ridge tops having been the location for vision quest sites. While the Forest Service concurs that actually locating a cultural site would be difficult in the dense, forested environment associated with the project area, it appears that the area holds greater potential for prehistoric activity than indicated in the Senco-Phenix study, evidence of which is likely to be found only with more intensive surveys.

A third phase of the archaeological study for the Chevron project area was conducted in August and October 1988. In this survey by the Forest Archaeologist, a prehistoric lithic scatter (evidence of a campsite) and an historic site were identified outside of the project area, and properly recorded. In addition, some informal "testing" was conducted. Both the lithic scatter and the historic site could be considered significant, but neither will be subjected to any direct or indirect impacts from the proposed exploration. An isolated projectile point, considered to be from the Middle Period (approximately 4,000 years ago), was found in the vicinity of the alternate access route which leads to the drill site from the Badger Cabin area. No other cultural materials were found in association with this isolate. While no sites were recorded along the South Fork Two Medicine River, it nonetheless appears to possess a moderately high potential for prehistoric activity.

Historical Research Associates (T.W. Greiser and Plochman, 1983; T.W. Greiser 1984; S. Greiser and Quigg 1985) conducted intensive archaeological inventories of the proposed Fina drillsite and the various Fina access alternatives that were addressed in the Hall Creek Environmental Assessment (BLM and Forest Service, 1985). Included in this survey were the present Fina *Alternatives A2, B2, and C2*. The Forest Archaeologist spot-checked this inventory on various occasions. Three cultural sites were found during these surveys. Two of the sites found by Historical Research Associates have been determined to be not significant and are ineligible for listing on the National Register of Historic Places by the Montana State Historic Preservation Office. The third site consists of a prehistoric campsite, evidenced by one bifacial tool and three flakes. Two small tests did not reveal a subsurface component. This site is located within the access corridor of *Alternative A2*. Site eligibility would need to be determined if *Alternative A2* was selected as the preferred alternative.

With the exception of Fina road *Alternative D1* and helicopter *Alternative landing zones F8 and F9*, all of the Fina access alternatives have been intensively inventoried. The Forest Archaeologist conducted a preliminary survey of *Alternative D1* and the Fina drillsite in August 1988. No cultural values were found. An intensive survey would be required if alternative D1, F8, or F9 was selected as the preferred alternative.

M. BLACKFEET RESERVED RIGHTS

The Badger-Two Medicine area, or RM-1 Unit, was once part of the Blackfeet Indian Reservation. Various treaties and agreements between the Blackfeet Indian Nation and the United States reserved to the Blackfeet certain use rights on these ceded lands. The following is a discussion of specific rights granted or retained by each party in these agreements:

Treaty With The Blackfeet, 1855

Article 4 gives Blackfeet Nation exclusive control over area of land that includes ceded land excepting as may be otherwise provided in this Treaty.

Article 8 somewhat modifies the exclusive control and provides for the United States the construction of roads of every description and the use of materials of every description found in the ceded lands.

Agreement of May 1, 1888

Article VIII provides that whenever, in the opinion of the President, the public interests require the construction of railroads or other highways through any portion of the Blackfeet Country, right-of-way shall be granted for such purposes.

Agreement With The Indians Of The Blackfeet Indian Reservation In Montana, 1896

Acquired the ceded lands in the name of the United States as public lands and open to occupation, location and purchase under the provisions of the mineral-land laws only.

Article I - "For and in consideration of the sums to be paid and the obligations assumed upon the part of the United States, as hereinafter set forth, said Indians of the Blackfeet Reservation hereby convey, relinquish, and release to the United States all their right, title and interest in and to that portion of their present reservation . . . provided, that said Indians shall have, and do hereby reserve to themselves, the right to go upon any portion of the lands hereby conveyed so long as the same shall remain public lands of the United States, and to cut and remove therefrom wood and timber for Agency and school purposes, and for their personal uses for houses, fences, and all other domestic purposes: and provided further, that the said Indians hereby reserve and retain the right to hunt said lands and to fish in the streams thereof so long as the same shall remain public lands of the United States under and in accordance with the provisions of the game and fish laws of the State of Montana."

Representatives of the Blackfeet Tribe, Forest Service and Bureau of Indian Affairs have been meeting since December 19, 1985 to discuss resource issues related to Blackfeet rights reserved under the 1896 Agreement. On September 9, 1986 and on November 7, 1986, resolutions were adopted by the Blackfeet Tribal Council concerning these discussions. In addition, the Tribal Council approved a number of informal agreements between the Council and the Forest Service on November 17, 1986. This action was documented in a letter by Earl Old Person, Chairman of the Tribal Council on November 18, 1986. The above documents regarding discussion with the Blackfeet are found in Appendix J.

N. SOCIOECONOMICS

The purpose of this section is to describe the current economic and social conditions of the area that may be affected by the proposed Chevron and Fina exploration wells.

1. Economic Conditions

The economic portion of this section provides information regarding population characteristics, regional economy, employment, earnings, and public finance. For this purpose, two zones of influence were established. The zones used in this study are the local area and the State of Montana. The local area is defined as that area where people's lifestyles are most likely to be affected, which in this case is Glacier and Pondera Counties, including the Blackfeet Reservation. The State of Montana is used for comparison purposes.

Population Characteristics

The combined population of Glacier and Pondera Counties was 18,200 in 1983 (2 percent of Montana's total population). This is a 5 percent increase from 1970 compared to a 18 percent increase for the State of Montana. These counties are rural and sparsely populated. The population of the Blackfeet Reservation increased 41 percent from 1970 to 1983. Table 3.7 is a comparison of population characteristics between these local areas and Montana as a whole.

Table 3.7
Population Characteristics for the Local Area and Montana

	1970	*1980*	*1983*	*% Change 1970-80*	*% Change 1980-83*
Blackfeet Reservation	6,270	6,600	8,851	6	33
Glacier County	10,783	10,628	11,200	-5	5
Pondera County	6,611	6,731	7,000	4	4
Montana	694,409	786,690	817,000	4	4

dated

Sources: U.S. Bureau of Census (1973 and 1985)
Blackfeet Comprehensive Plan (1972 and 1984)

The largest community in the two-County area is Cut Bank with a 1980 population of 3,688. Other towns include Browning (1980 population 1,226), East Glacier Park (356), Heart Butte (386), Conrad (3,074) and Valier (640). Although the overall county population was relatively stable from 1970 to 1983, during the period 1970 to 1980, the communities of Browning and East Glacier Park decreased in population 28 percent and 21 percent respectively, while the community of Heart Butte increased in population by 20 percent. The 1980 Census shows the population for Browning to be 1,226; however, about 3,000 to 4,000 people are considered to comprise the surrounding community. See Table 3.8 for a comparison of population characteristics for selected communities in the local area.

Table 3.8
Population Characteristics for Selected Communities in the Local Area

Community	*1970*	*1980*	*% Change*
Browning	1,700	1,226	-28
East Glacier Park	450	356	-21
Heart Butte	321	386	20
Cut Bank	4,004	3,688	-8
Conrad	2,770	3,074	11
Valier	651	640	-2

Sources: Blackfeet Comprehensive Plan (1972 and 1984)
U.S. Bureau of Census (1981)

Projected population and employment levels for the counties and selected communities are included below in Table 3.9. These projections are for 1985 through 2005 and are based on available information from the area. The proposed projects are not specifically incorporated into these projections.

Table 3.9
Current and Projected Population and Employment Levels through the Year 2005 for Glacier, Pondera Counties and Selected Communities

		POPULATION			EMPLOYMENT		
	Year	Total	Change	%	Total	Change	%
GLACIER COUNTY	1985	11,449			4,433		
	1990	11,948	498	4	4,591	157	3
	1995	12,388	440	3	4,760	169	3
	2000	12,848	459	3	4,936	176	3
	2005	13,319	471	3	5,118	181	3
PONDERA COUNTY	1985	7,042			2,966		
	1990	7,369	326	4	3,071	105	3
	1995	7,710	341	4	3,184	113	3
	2000	8,067	357	4	3,302	118	3
	2005	8,394	326	4	3,424	121	3
BROWNING	1985	1,320			567		
	1990	1,380	59	4	587	20	3
	1995	1,432	52	3	609	21	3
	2000	1,485	52	3	632	22	3
	2005	1,540	54	3	655	23	3
CUT BANK	1985	3,973			1,751		
	1990	4,138	165	4	1,813	62	3
	1995	4,288	149	3	1,880	66	3
	2000	4,447	159	3	1,950	69	3
	2005	4,611	163	3	2,022	71	3

Source: modified from Chase et.al., (1982)

Regional Economy

Like Montana, the local area derives its economic strength from natural resources. Most of the areas' employment, personal income and gross regional product are derived from the utilization of natural resources. Many of the economic sectors are directly related to some type of natural resource and several other sectors are indirectly related to natural resource production, extraction or utilization. These resources include land which is used for crop and livestock production, timber, oil and gas production, and water and wildlife that offer outdoor recreation opportunities.

A description of the oil and gas extraction and tourism industries that have the potential to be affected by oil and gas exploration is given in the following section. Whenever possible, production data is given for each industry to indicate historic output levels and the relative contribution of each industry to the economic base of the area.

This is not correct

6.5 million in 1987

Dated

The oil and gas industry has been present in Montana since the early 1900's and is an important basic industry providing 4,200 jobs (one percent of the employment) and $122 million in earnings (two percent of the total income earnings) for Montana workers in 1984. Employment in the oil and gas industry in Montana is down substantially from its peak of 6,825 workers in 1981. Table 3.10 shows oil and gas production for Glacier and Pondera counties and for Montana for the years 1982 through 1986. In 1986, 10 percent of Montana's total gas production and 6 percent of the total oil production was from the two-county area. Table 3.11 shows oil and gas production for the Blackfeet Reservation for the years 1982 through 1986. In 1986, 4 percent of Montana's total gas production and 1 percent of the oil production was from the Blackfeet Reservation.

370 in 1987

6.0 (87)

what year

It is estimated that the oil and gas extraction sector provides most of the 414 mining jobs and $6.1 million in earnings or 5 percent of the areas' employment and 5 percent of the earnings for the two-county area (Table 3.12).

Evaluating the recreation and tourism industry is difficult because data are often unavailable and employment and income earnings involve many other industry sectors. The major factor when evaluating this industry is the expenditures of the nonresident travelers and tourists.

Nonresident travel in Montana was estimated at 2.2 million visitors in 1983 with expenditures estimated at $423 million (Montana Department of Commerce, 1985). This spending supported about 10,500 jobs and $106 million in earnings for Montana workers. This is about 3 and 2 percent, respectively, of the state employment and income earnings respectively. The majority of travel and tourism expenditures occurs in relatively few Montana counties (Table 3.13). It is estimated that 23 percent of Glacier County's employment and 9 percent of the earnings are travel related.

-50'

Table 3.10
Oil and Gas Production for Glacier and Pondera Counties and Montana: 1978-1986

		Glacier		*Pondera*		*Montana*	
Year		*Quantity*	*% Change*	*Quantity*	*% Change*	*Quantity*	*% Change*
1986	Oil*	1,339,391	- 4	361,336	- 5	26,326,916	-13
	Gas**	3,797,212	6	631,242	-13	43,657,231	- 9
1985	Oil	1,389,902	0	379,992	- 6	30,284,836	- 1
	Gas	4,036,894	32	725,002	-13	48,068,343	- 1
1984	Oil	1,395,188	0	403,083	- 7	30,668,305	5
	Gas	3,062,034	-14	832,440	-27	48,499,939	4
1983	Oil	1,392,774	- 5	433,888	- 6	29,320,419	- 5
	Gas	3,574,831	-15	1,142,945	8	46,422,761	- 4
1982	Oil	1,463,621	- 8	460,894	27	30,937,514	1
	Gas	3,101,586	50	1,056,651	-37	48,337,829	- 1

* barrels
** thousand cubic feet

Sources: Montana Department of Revenue (1985-1987) and unpublished data.

Table 3.11
Oil and Gas Production for the Blackfeet Reservation: 1982-1986

	*Oil Production**		*Gas Production***	
Year	*Quantity*	*% Change*	*Quantity*	*% Change*
1986	994,960	-16	466,548	-24
1985	1,180,809	21	611,318	-2
1984	976,285	-30	625,587	-7
1983	1,387,189	4	670,221	-5
1982	1,337,157	-	705,171	-

* barrels
** thousand cubic feet

Source: Blackfeet Tribe, Department of Revenue, (1988)

1986

Table 3.12
Mining Employment and Earnings
in Glacier and Pondera Counties: 1980-1984 (1986 dollars)

	Glacier County		*Pondera County*	
Year	*Employment*	*Earnings ($1,000)*	*Employment*	*Earnings ($1,000)*
1986	353 299	5,136	61	944
1985	432	8,620	56	837
1984	452	9,564	54	782
1983	422	8,900	45	658
1982	498	11,377	44	717

Source: U.S. Department of Commerce (1988)

Table 3.13
Concentration of Travel-Related Employment and Earnings in Montana Counties: 1983

County	*Number of Workers*	*Earnings ($1,000)*
Yellowstone	1,575	15,900
Gallatin	1,155	11,660
Flathead	1,155	11,660
Cascade	945	9,540
Silver Bow	735	7,420
Missoula	735	7,420
Glacier	735	7,420
Lewis & Clark	525	5,300
Park	315	3,180
Dawson	315	3,180

per capita more meaningful

Source: Montana Department of Commerce (1985)

Recreation use in the RM-1 Unit is estimated at 24,240 recreation visitor days annually (Forest Service, 1986a). Recreationists using these public lands spend an estimated $1.4 million annually (US Fish and Wildlife Service and Bureau of Census, 1980; Bureau of Land Management, 1982). These expenditures represent direct payments to sporting goods stores, motels, service stations, and other services. As recreation expenditures circulate through the economy, an estimated $2.9 million will occur in business activity with $900,000 in earnings, and the equivalent of 60 jobs primarily in the retail trade and service sectors.

Employment

Figures for 1982 and 1986 show government, services, agriculture and retail trade to be the main sources of employment in the local area (Table 3.14). The service and retail trade sectors are related to the travel and tourism industry. Those sectors of the economy accounted for 76 percent of the 1984 total employment. During 1986, 14 percent of the work force was employed in the retail trade sector, 15 percent in agriculture, 28 percent in services and 19 percent in government. Total employment decreased 2 percent from 1982 to 1986. During this same period, employment in Montana increased by 3 percent. While total employment decreased by only 3 percent, some sectors of the economy experienced significant changes. Manufacturing employment decreased 32 percent and mining decreased 24 percent, while employment in agricultural services increased 11 percent.

Figures for 1980 show public administration and services to be the main sources of employment on the Blackfeet Reservation (Table 3.15). Those two sectors of the economy accounted for 52 percent of the 1980 total employment. This compares with 1972 when agriculture and services were the main sources of employment. Employment on the Blackfeet Reservation increased by 177 percent from 1972 to 1980 with increases in all sectors of the economy except agriculture where employment declined 7 percent. Although the number of jobs increased significantly, the unemployment rate as a percent of the civilian labor force increased from 37 percent in 1972 to 53 percent in 1981.

Table 3.14
Employment by Type and Broad Industrial Sources for Glacier and Pondera Counties: 1982-1986

Industry	*1982*	*% of Total*	*1986*	*% of Total*	*% Change 1982-1986*
Farm	1,225	14	1,200	14	-2
Ag. servc.,Forest, Fish	71	1	79	1	11
Mining**	542	6	414 5%	5	-24
Construction	353	4	367	4	-4
Manufacturing	261	3	178	2	-32
Trans & Public Utilities	290	3	304	4	-5
Wholesale Trade*	427	5	438	5	3
Retail Trade	1,324	15	1,197	14	-10
Financ., Ins. & Real Estate	300	3	328	4	9
Services*	2,355	27	2,359	28	0
Government	1,485	17	1,626	19	-9
Total	8,633	***	8,490	***	-2

*estimate based on data from other years (information not available for disclosure)
**figures shown are primarily for oil and gas
***figures may not equal 100 due to rounding

(Source: U.S. Department of Commerce, 1988)

Table 3.15
Employment by Type and Broad Industrial Sources for the Blackfeet Reservation: 1972 and 1980

Wage and Salary	*1972*	*% of Total*	*1980*	*% of Total*	*% Change 1972-1980*
Ag. servc., Forest., Fish	325	38	301	13	-7
Mining*	0		57	3	
Construction	40	5	214	9	435
Manufacturing	30	4	97	4	223
Trans & Public Utilities	30	4	113	5	277
Wholesale & Retail Trade	105	12	316	14	201
Financ., Ins. & Real Estate	13	2	32	1	146
Services	195	23	587	26	201
Public Administration	120	14	536	24	347
Total	858	**	2,253	**	163

*figures shown are primarily for oil and gas
**figures may not equal 100 due to rounding

(Sources: Blackfeet Comprehensive Plan (1972), Montana Department of Commerce, 1985)

Earnings

Table 3.16 shows the two-county area earnings by source for 1982 and 1986. In 1986, services contributed 19 percent of the areas' total earnings while government contributed another 22 percent. In 1982, mining was a major source of earnings along with services and government. Total earnings in the local area were 7 percent lower in 1986 than in 1982, primarily because of a decline of farm, mining and manufacturing income. During this same period, total earnings in Montana decreased by 9 percent.

Table 3.16
Personal Income by Major Component for Glacier and Pondera Counties 1982-1986 (thousands of 1986 dollars)

Earnings by Industry	*1982*	*% of Total*	*1986*	*% of Total*	*% Change 1982-1986*
Farm	21,528	15	19,694	15	-9
Ag. servc, Forest, Fish	708	1	882	1	25
Mining**	12,094	9	6,080	5	-50
Construction	10,225	4	10,941	8	7
Manufacturing	5,683	4	2,256	2	-60
Trans. & Public Utilities	11,752	8	11,535	9	-2
Wholesale Trade*	9,436	7	8,712	7	-8
Retail Trade	14,470	10	13,096	10	-9
Financ., Ins. & Real Estate	3,827	3	4,594	4	20
Services*	25,926	18	24,289	19	-6
Government	24,821	18	28,797	22	16
Total	140,472	**	130,876	**	-7

*estimate based on data from other years (information not available due to disclosure)
**figures are primarily for oil and gas
***figures may not equal 100 due to rounding

(Sources: U.S. Department of Commerce, 1988)

Public Finance

Table 3.17 shows the 1986 total taxable valuation and taxes levied for Glacier and Pondera County. Net proceeds from oil and gas production accounted for 58 percent of Glacier County's total taxable valuation and 27 percent of Pondera County's. Property tax assessment on agricultural land and equipment accounted for 10 percent of Glacier County's total taxable valuation and 35 percent of Pondera County's.

Montana imposes four taxes on natural gas production; the resource indemnity trust tax, gas producers privilege and license tax, natural gas severance tax and net proceeds tax.

Table 3.17
Total Oil/Gas and Agricultural Taxable Valuation and Taxes Levied in 1986 for Glacier and Pondera Counties (1986 dollars)

	Glacier	*Pondera*
Total Taxable Valuation (all sources)	47,106,350	22,072,651
Oil and Gas Taxable Valuation	27,549,200	5,977,332
%	58	27
Agricultural Taxable Valuation	4,632,159	7,698,335
%	10	35
Total Taxes Levied	10,722,981	6,423,679
State	301,453	151,545
County	2,659,561	1,896,217
Schools	6,990,410	3,589,099
Other	771,557	786,818
Mills*	227.63	291.02

*Average mill levy based on total taxes levied and total taxable valuation.
(Source: Montana Department of Revenue, 1987)

Table 3.18 lists the taxes yielded from natural gas production within Montana in recent years.

Table 3.18
Taxes Received From Natural Gas Production
Within Montana: 1982-1986 (current dollars)

	Fiscal Year		*Calendar Year*
Fiscal/Calendar Year	*Indemnity Trust Tax*	*Severance Tax*	*Net Proceeds*
1986	628,000	2,891,000	14,253,000
1985	584,000	2,946,000	14,772,000
1984	589,000	2,798,000	14,776,000
1983	538,000	2,650,000	14,202,000
1982	491,000	2,660,000	11,977,000

(Source: Montana Department of Revenue (1983-1987) and unpublished data).

The Blackfeet Tribe, in addition to the State of Montana, imposes three taxes on oil and gas production; severance taxes, privilege taxes, and resource indemnity tax. The Blackfeet oil and gas production taxes generate revenues for general operation and maintenance of Tribal Government. Table 3.19 lists the taxes received from natural gas production within the Blackfeet Reservation in recent years.

Table 3.19
Taxes Received From Natural Gas Production
Within the Blackfeet Reservation: 1982-1986 (current dollars)

Year	*Severance Tax*	*Resource Indemnity Tax*	*Privilege Tax*	*Total*
1986	44,086	10,639	785	55,510
1985	69,764	15,799	1,076	86,639
1984	52,030	8,460	1,004	61,494
1983	58,421	13,857	1,131	73,409
1982	17,269	14,239	391	31,899

(Source: Blackfeet Tribe, Department of Revenue, 1988)

2. Social Conditions

This portion of the Socieconomic Section describes the social well-being, lifestyles, and attitudes and perceptions of the residents in the nearby communities. Indicators of social well being of residents in the study area, such as crime rates, per capita income, and unemployment rates are discussed. The discussion on lifestyles will address patterns of work and leisure, customs and traditions, and relationships with family, friends, and others. The discussion on attitudes and perceptions considers the feelings, preferences, and expectations people have for management of the Forest and use of the RM-1 Unit. The social conditions in the study are based on the comments received during the scoping process for this analysis (1986), comments on the Forest Plan (1985), newspaper articles, information from previous studies, Montana Department of

Commerce, U.S. Bureau of Census (1980), and results of informal interviews conducted during November of 1986 by Forest Service personnel (Hamlett et.al., 1986).

Social Well-Being

Table 3.20 presents indicators of social well-being for the Glacier-Pondera County area. These indicators present a mixed picture, suggesting the area has both the positive and negative factors associated with rural areas. These indicators are simply an inference and are not meant to be a direct measurement of social well-being or all encompassing. It should be pointed out that even if particular statistics show poor social well-being, the residents may not perceive their situation as such. The two-county area lacks some basic services when compared to Montana as a whole. The number of physicians per person is lower, education levels are lower, the proportion of housing lacking some or all plumbing is higher and the proportion of housing with no complete kitchen facilities is higher. Pondera County per capita income is higher than the state but per capita income for Glacier County is significantly lower. The unemployment rate for Pondera County is lower than the state while the rate for Glacier County is slightly higher.

These indicators have changed from 1970 to 1980 and show that overall, the areas' standard of living has improved. The percentage of families with income below the poverty level has decreased and education levels are higher. At the same time per capita income increased 30 percent for Glacier County and 40 percent for Pondera County and mean family income increased 16 percent for Glacier County and 30 percent for Pondera County (adjusted for inflation). This compares with a 20 percent increase in per capita income and a 28 percent increase in mean family income for Montana.

The Blackfeet Reservation shows the same general characteristics as the Native American population in the State; i.e., a lower percentage of high school graduates, significantly higher unemployment rates, lower income levels, the proportion of housing lacking plumbing is higher, and the proportion of housing with incomplete kitchen facilities is higher.

Table 3.20
Indicators of Social Well-Being for the Local Area and Montana

Indicators	*Years*	*Blackfeet*	*Glacier*	*Pondera*	*Montana*
Physicians Per 100,000 Population	1984	53.0	53.0	70.4	153.6
	1980	---	65.9	74.3	133.5
Crime Rate Per 1,000 Population	1983	24.5	NA	9.9	42.8
	1979	---	4.2	20.2	44.4
Per Capita Income	1980	3,293	5,362	6,661	6,596
	1970	1,048	2,119	2,463	2,712
Families with Income Below the Poverty Level, %	1979	63.6	16.7	10.8	9.2
	1969	47.8	23.4	14.2	10.4
High School Graduates, Percent of Population Over 24	1980	57.2	67.9	68.7	74.4
	1970	---	50.1	55.4	59.2
Unemployment Rate, Percent of Civilian Labor Force	1980	53.4*	8.6	6.2	8.3
	1970	36.6*	12.6	3.2	6.2
Mean Family Income	1979	14,118	18,430	21,890	20,679
	1969	---	8,353	8,800	9,662
Year-Round Housing Units with No Bath or Only Half Bath, %	1980	8.0	5.6	4.9	4.0
	1970	---	14.5	8.8	9.0
Year-Round Housing Units with No Complete Kitchen Facilities, %	1980	7.7	4.6	6.0	3.0
	1970	---	10.1	7.8	6.4

* unemployment rates are for 1981 and 1972
NA - Not Available

Sources: Blackfeet Comprehensive Plan (1972 and 1984)
Montana Department of Commerce (1985a)
U.S. Bureau of Census (1972, 1973, 1982, and 1983)

Lifestyles

Browning, Montana, is located in the west central portion of the Blackfeet Reservation in Glacier County. It is the largest community on the Reservation. About 1,200 people live in Browning (1980 Census) while about 3,000 to 4,000 people are considered to comprise the surrounding community. Browning is the center for government, transportation, and health and human services for outlying rural communities. Although Browning is the main townsite on the Reservation, it has suffered considerable economic setbacks.

The economically depressed conditions in the community are obvious from the number of vacant buildings along the central area of town. The combined effects of the reduction in oil and gas revenues, a reduction in leased grazing, and cutbacks in Federal assistance programs have reduced the cash flow on the Reservation. Many people rely on financial assistance from Federal and Tribal governments. When oil and gas activity was high, the economic situation on the Reservation was much improved over the current situation. Some residents feel that any type of development will create an economic boom to the Reservation and help the unemployment situation.

The Blackfeet Tribal Council has realized a need to attract long-term, labor intensive industry, and the Blackfeet Economic Development Council is pursuing this. The Blackfeet Planning Department focuses upon raising the living standards, improving job opportunities, developing resources, and improving physical facilities. Location and lifestyle may be more important to local residents than some other economic or social indicators of well-being. As it is now, the Blackfeet feel the Reservation land is theirs, and they are together as a people. It is important to the people to have a localized control of their development and future.

Some Blackfeet members are concerned over the slow reduction in the Reservation land base. Indian allotments have been sold over the years to nonmembers and some view this loss as a shrinking of the Reservation, possibly a loss of control over the land, and/or a potential loss of revenue for tribal members.

Considering the current economic conditions, people see oil and gas exploration as potentially affecting community stability. Conflicting viewpoints among the Blackfeet members on religious needs, Wilderness designation, and differences in the interpretation of the 1896 Treaty Rights are regarded as being potential areas of conflict. While some people in the community feel that oil and gas development would provide a cohesion to the community, others are concerned that development would bring an influx of people.

The Blackfeet people have strong family bonds. Tribal members willingly share with others less fortunate than themselves and may even support a member in need by allowing them to live within the family home without regard to repayment. Many members who have left the Reservation at some point in their lives for educational or employment pursuits eventually return to rejoin their families. Many people enjoy living in the area because of the remoteness, low population, Reservation and family ties, and scenic qualities.

Heart Butte, Montana, is located in the southern portion of the Blackfeet Reservation. About 380 people live in the town of Heart Butte (1980 Census) while about 500 to 600 people are considered to comprise the surrounding community. The only services in town consist of a gas station/convenience store. There are no restaurants or grocery stores. In addition to the government agencies, Heart Butte Industry (which produces disposable clothing, such as for hospitals) and the Jack Pine House (alcohol rehabilitation) have operated for a number of years. Heart Butte is a family-oriented community. Most Native Americans who live in Heart Butte were raised there, but left for a period of time, returning to live with family and friends. There is a good sense of community and friendship. Most people who live in the Heart Butte community are ranchers. Some are students at the Blackfeet Community College in Browning, while others commute daily to jobs in Browning. There are also a number of teachers and the Heart Butte Industry employs about 20 to 30 people and the Jack Pine House employs a few counselors. The people of Heart Butte enjoy the beauty of the area and value its pristine qualities, including clean water and air. Like the rest of the Reservation, Heart Butte is economically depressed. Many people live at near-poverty levels. People would like to see certain types of economic development because jobs are needed. There is presently a resurgence of traditional religion, in addition to the religious practices which have occurred all along. Some people feel that religious beliefs could serve to help people who abuse alcohol and/or drugs.

The community of Cut Bank lies on the northern Montana prairie and is the seat of Glacier County. Cut Bank is supported by agriculture and oil industries. The town's support services such as farm implement stores, oil and gas services, western wear stores, and other related businesses reflect these two main industries. Besides the farmers and ranchers coming into town for services, there is also much trade from the residents of Browning. The drop in oil prices that began in 1983 has had an impact on the community. Many area residents have been seeking alternative sources of employment. Agriculture continues, but like many Americans in agriculture, area farmers and ranchers are simply trying to hold on to what they have. In the meantime, the youth have little, if any, hope of finding local employment when they graduate from high school. Farming and oil and gas development have instilled self-sufficiency and self-reliance and at the same time brought neighbors close together forming a community with a high degree of cohesion and participation. Cut Bank residents feel a strong attachment to the land and most feel that the land should be used to its highest potential and then passed on to future generations. For the average person in Cut Bank, the National Forest represents a place to recreate and get away from the routines of everyday life. It offers a place to hunt, hike, ride horses, snowmobiles or trailbikes, fish and to generally enjoy the scenery. Cut Bank residents believe that the National Forest offers one of the few places for the community residents and others on the Highline to enjoy motorized recreation. Of all the recreational activities that are engaged in, one important element is that they are done in conjunction with other people.

NO SURVEY?

The community of East Glacier Park is located on the northern boundary of the study area. It is on the Blackfeet Reservation and the eastside entrance to Glacier National Park. About 350 people live in East Glacier Park (1980 Census). Several large ranches lie in the foothills near this community. Being close to Glacier National Park, businesses rely mostly on tourism, serving general Highway 2 travel year-round and gearing up for the summer tourist traffic. During the summer, there is a hectic pace as tourists visit the National Park or move between eastern Montana and the Flathead Valley west of the Continental Divide. Motels, restaurants, gas stations and souvenir shops cater to this traffic. After Labor Day, the town quiets down and the majority of business close, waiting for the next tourist season. Many business owners grew up in the East Glacier Park area, either on a farm or were farmers themselves. Some have been involved in the oil and gas industry. They feel that the community has declined economically for the past several years. There is a marked difference between the summer and nonsummer populations. The summer population has slowly crept up over the years as more and more tourists come to Glacier National Park, while the winter population has declined with fewer businesses remaining open during the winter. Less snowmobile tourism is seen.

Many people live in East Glacier Park because of the recreational and scenic values of Glacier National Park and the National Forest, and prefer to make a daily 12-mile commute to Browning for their employment. Many of the commuters are teachers, medical personnel, and other professionals. Residents tend to be one of two groups, those who grew up in the area and will probably remain, and those who have migrated from outside and will spend a few years and then move on. The second group is made up of teachers and other professionals who have common interests. The teachers and other professionals tend to enjoy hiking and cross-country skiing on the National Forest, while others appreciate the hunting, snowmobiling and four-wheel driving.

Attitudes and Perceptions

People living in the study area place different values on the National Forest System lands and have differing viewpoints on management of the National Forest. These viewpoints can be categorized into groups based on similar interests, values, activities, or occupations. These groups overlap, depending on the similarities between the groups. In general terms, the groups can be categorized as: Religious/Cultural, Environmental/Preservation, Recreation, Outfitter/Guide, Landowner/Livestock Operator, and Oil and Gas/Business.

The following is a discussion of 1) the values and attitudes that each group has for the National Forest land and 2) the perceptions and attitudes that the group has about oil and gas development on the National Forest.

a. Religious/Cultural

The Religious/Cultural group includes those people who identify with Blackfeet religion, culture, spiritual and/or traditional cultural values. Most everyone affiliated with this group has a deep respect for the mountains. Many use the Forest for recreational purposes like camping, hunting, and fishing. Some members of this group use the National Forest lands specifically for the enactment of traditional Blackfeet religious/spiritual practices. These people travel to the Forest seeking a high level of solitude, a condition desired in the practice of their native religion. They feel that they have already lost the opportunity to achieve the necessary solitude on the reservation lands and the adjacent National Park lands. Some of the members of this traditional religious group believe that the RM-1 Unit was historically used by the Blackfeet for spiritual purposes. They feel the lands are sacred and value them for their religious significance. Others respect the rights of those who engage in the Blackfeet practices but do not practice the traditional religion themselves.

Not all Blackfeet feel strongly about using the area for religious purposes. These people question the validity of the claim that the Blackfeet historically used this area of the National Forest for religious purposes. Nevertheless, these individuals also value the mountains for recreational reasons. They feel that the National Forest deserves protection from oil and gas development which would detract from the area's natural beauty.

Those affiliated with the Religious/Cultural group are seeking protection for the RM-1 Unit for a variety of reasons. Those involved in the traditional religious practices oppose any development that could increase access into the area. They feel that the increased access will encourage additional use of the area and disrupt their opportunities for achieving solitude. The National Forest provides a place where special plants can be gathered for traditional ceremonial purposes. These people are promoting protection of the RM-1 Unit because they feel that the area is the last stronghold providing these natural qualities. Those claiming that the Tribe traditionally utilized this area for spiritual purposes feel that the lands should be protected to preserve their sacred character. They value retaining the pristine character of the lands for recreational reasons. Religious and cultural concepts are discussed in more detail in Section III.L.

b. Environmental/Preservation

Those affiliated with the Environmental/Preservation group value the National Forest lands for their undeveloped, pristine character. They oppose the use of motorized vehicles in the area, whether for recreation or development purposes. They feel a strong bond with nature, and view the RM-1 Unit as one of the last frontiers to be protected from development that might damage wildlife populations, scenic qualities, recreation opportunities, or watershed conditions.

The Environmental/Preservation group opposes any further development in the RM-1 Unit. In fact, many feel that past seismic exploration has already caused resource management problems. They view additional development or exploration of any kind (timber, oil and gas, roading access) as a serious threat to the natural condition and pristine setting that they are seeking for their recreational pursuits. They also oppose motorized vehicle use on the existing trails and roads in the area and would support a movement to classify the area as Wilderness to ensure its future protection.

c. Recreation

The wide-open spaces and generally unroaded condition of the RM-1 Unit attracts recreationists seeking a relatively high level of solitude. The area is popular with hikers, backpackers, hunters, snowmobilers, cross-country skiers, motorcyclists, and horse users. Generally, the recreationists can be divided into

Hunters

those supporting motorized recreation use and those opposed to motorized use. Those interested in motorized use of the area, predominantly motorcycle and snowmobile, view the area as a haven for motorized use. They have already been restricted from using their machines in the adjacent Wilderness and National Park. Because the RM-1 Unit is undeveloped and overall use is relatively light, nonmotorized recreationists seek the quiet solitude of the area. Some who support nonmotorized recreation would like to see the area classified as Wilderness to protect the area for future generations and ensure protection of the wildlife, recreation, and other resource values.

Views on the degree of appropriateness of oil and gas development in the RM-1 Unit vary amongst the recreationists. Some of the non-motorized recreationists align themselves to a degree with the Environmental/Preservation group. While not all nonmotorized recreationists support the Wilderness classification idea, all agree that the existing landscape should remain essentially unaltered. They favor Wilderness classification to ensure protection of the area. The opportunity to have a recreation experience without the interruption from the noise of a motorized vehicle is important to them. The advocates for retaining motorized recreation opportunities in the area generally do not oppose oil and gas development if it can be monitored to minimize the amount of environmental change. Some motorized users favor development if it will provide additional access opportunities for them.

d. Landowners/Livestock Operators

Those people who graze livestock on the Lewis and Clark National Forest or who own land adjacent to the National Forest, value the generally undisturbed condition of the water, soil and wildlife resources in the RM-1 Unit. Some of the landowners recognize a strong environmental link between their property and the adjacent National Forest lands. They view the National Forest as a source of water resources for the adjacent private lands.

Livestock operators within this area have a strong respect for the landbase that provides seasonal grazing. Although they have had experience with seismic and oil and gas development in the past, oil and gas exploration is viewed as a temporary condition that may cause an inconvenience for one or two grazing seasons, but should not produce long-term adverse problems.

Some adjacent landowners feel that resource degradation of the National Forest is inevitable with oil and gas development. They fear any environmental damage to the Forest will ultimately result in environmental problems on their own lands. Other landowners indicated that they favor oil and gas development on the Forest in the hopes that interest might be sparked on their own private lands. The livestock operators in the area do not oppose oil and gas development; however, they are concerned that appropriate regulatory measures be taken to protect the conditions needed for their operation.

e. Outfitters and Guides

Like the livestock operators, the outfitters and guides derive direct economic gain from the National Forest. Clients are drawn to the RM-1 Unit seeking a backcountry recreation experience in a remote, relatively unused portion of the National Forest. For this reason, they value the retention of the area in its most undisturbed condition.

The outfitter and guides oppose oil and gas development in the area where they operate, because their clients come to the area for its natural beauty and the wildlife/hunting opportunities and any alteration or development of the area is viewed as a detriment to their livelihood.

f. Oil and Gas/Business

Business people in the surrounding communities have mixed feelings about the appropriate use of the National Forest lands. Those dependent on the seasonal tourist traffic (motels, gas stations, grocery stores) realize that the natural beauty of the surrounding lands is what draws their customers. Many of their clients are either traveling to Glacier National Park during the summer or hunting on the National Forest during the fall.

Those business people with direct ties to oil and gas development and associated services feel the Forest should be managed under the multiple use concept. They feel that recreation and energy development can be compatible uses of the Forest lands. Many of these business people are located in the Cut Bank area where oil and gas development has already occurred. They are familiar with the technology and the environmental effects on the prairie lands and feel that with appropriate controls, development could be allowed on the National Forest without causing irreparable damage.

Business people dependent on the tourist trade generally do not support any development that could potentially decrease the amount of tourist traffic to the area. The majority of the businesses along the main thoroughfares rely on tourists visiting the area to enjoy the natural beauty. Any alteration of the scenic beauty or recreational opportunities of the National Forest are viewed as a detriment to their business.

Business people in the oil and gas industry strongly favor oil and gas development on the National Forest. The recent downturn in the oil industry has been a hardship for these businesses and any renewed interest on the Forest is welcomed. With appropriate monitoring and administrative controls, they feel that development can be made compatible with the other uses of the National Forest.

O. HEALTH AND SAFETY

As required by BLM regulations, Chevron and Fina have developed contingency plans to insure the safety of all personnel and the general public in the event of equipment failures and/or disaster while drilling in formations which may contain hydrogen sulfide or carbon dioxide (Appendix B). While hydrogen sulfide may not be encountered in either well, its potential occurrence requires prior planning to assure safe operations if the gas should be present. The BLM must review and approve the contingency plans as a separate action prior to acting on the APD.

There are no known incidences of sickness, disease, or health effects for the local area due to oil and gas activities (Hal Robbins, Air Quality Bureau 1987, personal communication). State permits would be required if it was determined that release of hydrogen sulfide or carbon dioxide gases would exceed the State standards for air quality. State and Federal regulations would also apply in protecting water sources from contamination by drilling and disposal of solid waste materials.

Other information pertinent to describing the health and safety environment for the RM-1 Unit is contained under the Section III.A-Oil and Gas Exploration and Development, Section III.B-Water Resources, Section III.C-Air Quality, and Section III.D-Access Management and Reclamation.

CHAPTER IV. ENVIRONMENTAL CONSEQUENCES

This chapter describes the potential consequences of implementing the proposed Chevron and Fina projects. The Chapter is organized into four sections. Section IV.1. describes the effects of implementing the Chevron project proposal and the various Chevron alternatives described in Chapter II. Section IV.2. describes the consequences of implementing the Fina project proposal and the various Fina alternatives described in Chapter II. Section IV.3 addresses effects that might result should both the Chevron and Fina be approved for operation during the same time frames, or one after another. Section IV.4 identifies and addresses the cumulative effects of the proposed actions with other reasonably foreseeable actions in and adjacent to the study area.

The environmental analysis responds to the issues identified in Chapter I.C. The issues addressed were identified through a public scoping process (See Chapter VII) and through consultation with various organizations and government agencies. Bureau of Land Management and Forest Service management concerns are also included in the analysis.

The discussions in Sections IV.1. (Chevron) and IV.2. (Fina) address the direct, indirect, and cumulative effects of the proposed projects and are discussed in terms of three scenarios or reasonably foreseeable actions. These scenarios are: 1) A Dry Hole, 2) A One Well Production and 3) A Field Production. Theses scenarios do not constitute proposed or planned activities, but were included in the analysis to show the foreseeable and cumulative effects that may occur should the proposed projects be approved for drilling. The three scenarios were developed based on information and analysis contained in Appendix L. Information used in preparing this appendix is from numerous public sources. The scenarios are not based on information or plans submitted per se by Chevron and Fina in conjunction with their APDs.

A Dry Hole

The probability that either of the proposed wells will be a "dry hole" ranges from 84:1 to 98:1. Information obtained from drilling the proposed well, however, may indicate the need for a second well to further test the target structure. It is likely that a second well (if requested and if approved) would be drilled within 1 to 2 years following completion of the first well, and that the first well site would be reclaimed prior to drilling the second. Although it is possible that both the first and second wells could be drilled at offset angles from the same drill pad, it is more likely that a second well would be relocated and drilled from another surface location near the target zone that is suitable and available for occupancy. For analysis purposes it is assumed that the method used to access the first well would also be used for the second well, and that similar mitigation requirements would apply.

One Well Production

The probability that either Chevron's or Fina's proposed wells will go to production is 5.5 percent for oil and 7.2 percent for gas. Should production occur the most probable scenario would be development of a field with reserves estimated at one million barrels for oil, or six billion cubic feet for natural gas. Estimated production facilities and operations of a one well field are discussed in detail in Appendix L. The most probable production period for a one well field is six years. On termination of production the well would be abandoned, surface facilities would be removed, and the area reclaimed to the satisfaction of the Forest Service.

A Field Production

The probability that either Chevron's or Fina's proposed wells will lead to additional producing wells is about 1 percent. The most likely field development scenario is that there would be three producing wells, with a reserve estimated at 10 million barrels for oil, or 60 billion cubic feet for natural gas (Appendix L). Map 4.1 shows the general corridors determined suitable for long-term field production activities. These corridors are used as the basis for the analysis. Estimated production facilities and operations of a field development for the area are discussed in Appendix L. On abandonment of the field many years in the future, the surface facilities would be dismantled and removed and the area would be reclaimed to the satisfaction of the Forest Service.

The actions proposed by Chevron and Fina are introduced and described individually in detail in the introductions to Sections IV.1. and IV.2 The Chevron and Fina project proposals are also displayed in Appendix B. Section IV.1.A and Appendix N describes actions that would be involved in implementation of a helicopter supported drilling operation. These sections are included to give the reader a background of the actions that would be involved in selecting various alternatives, and to provide background information for the discussion of effects.

The analyses for the projects have been kept separate (Chevron IV.1 and Fina IV.2) to facilitate ease of reading and allow for separate decisions on the project proposals. In the compilation of the Fina section, the reader will be referred to the Chevron project discussions in Section IV.1 as much as possible to reduce the amount of duplication and bulk. Whenever different specific effects could occur, they are discussed for the Chevron project and the Fina project, as applicable.

Mitigation measures that are helpful in reducing environmental effects on the resources are included when applicable. General mitigation measures are listed in Chapter V. The ID Team's analysis of the proposals and alternatives incorporates, as near as practical, all the requirements and mitigation measures specified in the Applications for Permit to Drill (Appendix B). In providing for consistency in the evaluation, the ID Team based its analysis on assumptions that laws and regulations would apply, and that proposed oil and gas activities would meet the requirements of the Lewis and Clark National Forest (Forest Service, 1986a).

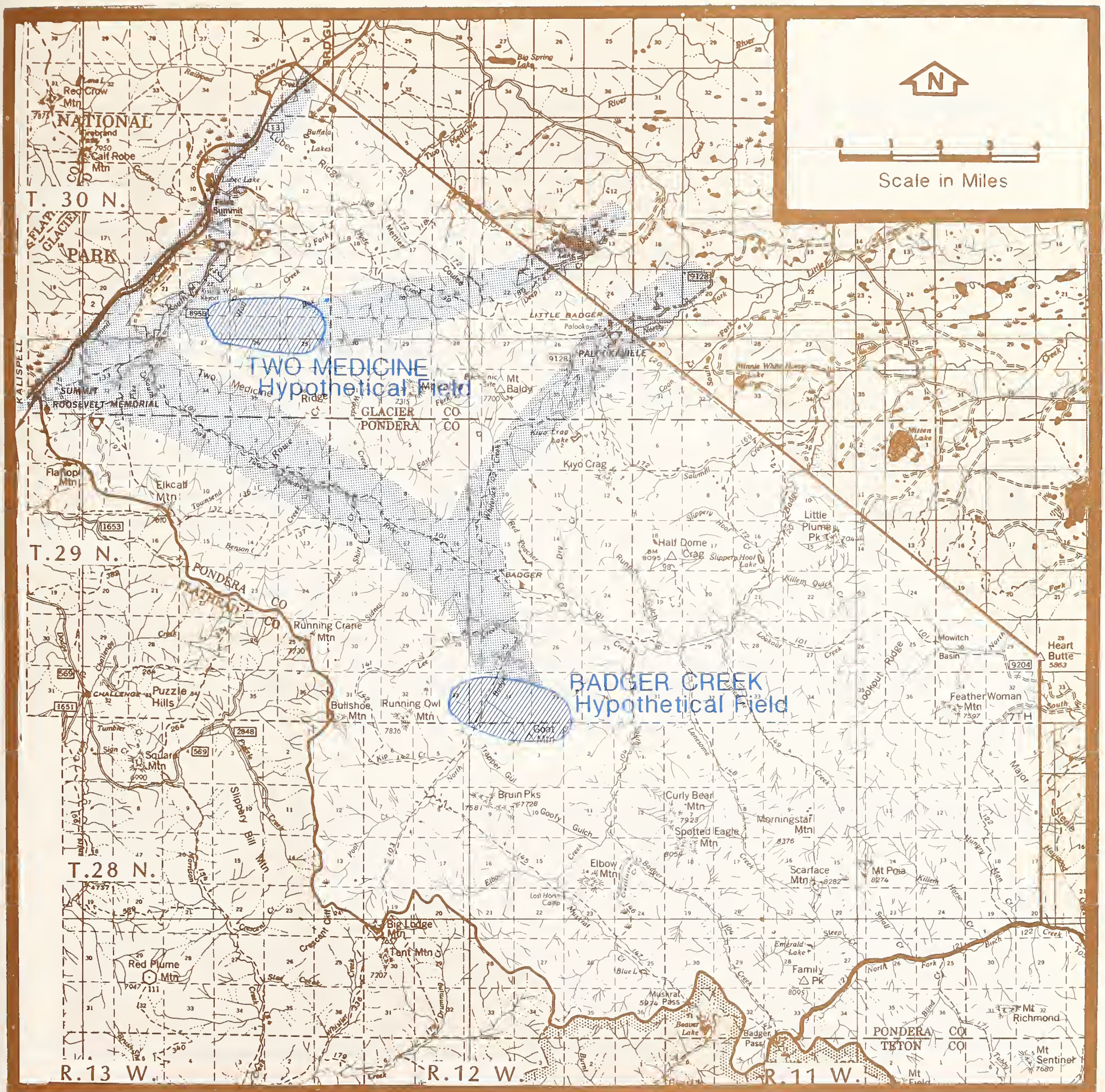
Section IV.3 discusses the effects of the alternative combinations of the Chevron and Fina projects should the two projects be allowed to occur simultaneously or successively. In this analysis, only the alternative combinations that were found to have combined effects in Chapter II.3 are analyzed.

Section IV.4. discusses the cumulative effects of the Chevron and Fina projects when considered in association with other reasonably foreseeable actions in the RM-1 Unit. Information used for the "other actions" was based on the best information available. The information used for the Chevron and Fina projects borrows from information sources discussed in IV.1 and in IV.2.

1. CHEVRON PROJECT

Chevron proposes to explore lease M25173 by drilling a well in the SW1/4 NE1/4 of Section 35, T.29N., R.12W. in Pondera County, Montana. The proposed well site is on the lower northeastern flank of Goat Mountain. Chevron identified two roaded access route alternatives to the well site. One route is to access the well site from the South Fork of the Two Medicine River off US Highway 2 near Marias Pass to the Badger Cabin. From the cabin the route is along the North Fork of Badger Creek and then to the well site. The other access alternative from the east was proposed from Palookaville over White Rock Pass to Badger Cabin and then as proposed in the first route. Mostly new and/or reconstructed road would be built for either of these two routes with lengths ranging from 17 to 20 miles. Bridges along the South Fork of the Two Medicine River and North Badger Creek would be built where necessary. Roads would be surfaced with aggregate rock where necessary.

Chevron proposes to restrict access to the well site during the operation to authorized personnel only. A crew camp is proposed to house drilling personnel. Road location and construction is expected to take approximately 18 weeks. Drilling, completion and reclamation are expected to take approximately 300 days. A hydrogen sulfide contingency plan is included in the APD (Appendix B).



LEGEND

▨ Potential Field Locations

░ Potential Oil and Gas Development Corridors

MAP 4.1 POTENTIAL DEVELOPMENT

Any necessary pits will be fenced and dikes will be constructed around the tank site and treater. Water-based fluids and mud cuttings will be contained in the reserve pit and fluid will be disposed of at an approved disposal site upon project completion. All produced fluids, septic tank effluent, and garbage will be properly contained on site and hauled to approved disposal sites on a regular basis. Topsoil will be stripped and stockpiled for later reclamation. Pit areas will be filled and recontoured upon project completion. Reclamation of the surface will occur immediately upon removal of the rig. Revegetation and rehabilitation will be in accordance with Forest Service guidelines. The following Section (IV.I.A.) discloses the effects of Chevron's proposal and alternatives according to the issues identified in Chapter I.

A. OIL AND GAS EXPLORATION AND PRODUCTION

An issue expressed by the project proponent during the scoping process was: How best to manage the cost of exploration and production while minimizing effects on the environment. Although the bulk of this EIS discusses the effects of the proposed oil and gas activity on other resources such as water, air, recreation, and wildlife, it is also necessary to include in the analysis how the alternatives and mitigation measures will affect the proposed operations and possible future oil and gas activities. Increased costs for exploration and production would require a greater gas and/or oil reserve to recover expenditures for drilling, producing, and marketing any gas or oil found.

Analysis of the alternatives gives an indication of the potential effects on exploration and development for oil and gas in the RM-1 Unit. The alternatives are discussed in terms of costs to the company, logistical considerations, safety, and the degree to which the company's operations and lease rights would be affected because of mitigation measures imposed for the protection of other resources. *Alternative 1A* (Chevron's proposal) is used as the base in which other alternatives are compared for cost figures.

Exploration Proposal

For the roaded alternatives, the drilling project would probably be spread out over a period of 3 to 4 years due to a restricted operating window (see Mitigation, Chapter V). The operating window is from July 15-April 1, a period of 8 1/2 months. This operations time period assumes that the first year would be for road construction, the second year for drilling and the third year for reclamation. Under all roaded alternatives, there could be an added cost for relocating trails obliterated by road construction. The number of miles of trail relocations and crossings are listed in Table 4.2.

Traffic during the exploratory drilling phase for roaded *alternatives 1A, 1B, 2, 6A, 6B, 7A, and 7B* would average approximately 20 trucks or vehicles per day (Chevron's Surface Use Plan, Appendix B). After the exploratory drilling phase was completed and the site reclaimed (if the well was abandoned), oil and gas related traffic would cease. All roaded alternatives would require a bridge over the North Fork of Badger Creek which would present construction time delays and some increase in costs (Map 2.8). The harsh weather conditions that occur in the RM-1 Unit, especially during the winter months, may increase costs of drilling, increase the likelihood of vehicle accidents, and prohibit access to the well site which could delay supplies critical to the safe operation of the drill rig.

The effects of implementing either *alternative 1A or 1B* would be similar (see Map 2.1). Both of these routes traverse the existing route in the bottom land and floodplain areas of the South Fork of the Two Medicine River. These alternatives would not provide Chevron with an all-season access road because portions of the road along the South Fork Two Medicine River would be reconstructed to a minimum standard without permanent bridges or culverts. Temporary bridges and stream crossings would be constructed across the river. These routes may not be usable during periods of high water and floods which could pose safety hazards during an on-going drilling operation. Development costs for alternatives 1A and 1B would be comparable (Table 2.1). If production were to occur using one or the other of these access routes, the exploration road would be reclaimed and an additional access road, at additional cost to Chevron, would be needed.

Alternative 2 would use a portion of the existing road to Whiterock Pass. Most of the road would be reconstructed to transport drilling and service equipment. Development costs are estimated to be slightly less than the base *alternative 1A*. The steep grades on portions of this route over Whiterock Pass, however, would probably increase costs due to delays during poor weather and pose more safety hazards than the other roaded alternatives.

The effects of implementing either *alternatives 6A or 6B* would be very similar, and would be desirable for providing all-weather access to the drilling site. Neither route would require the construction of a bridge across the South Fork of Two Medicine River. Estimated drilling costs for these alternatives would be approximately one percent less than the base *alternative 1A*.

Alternatives 7A and 7B would probably be the best for providing all-weather access to the drillsite due to their location on primarily south-facing slopes. Both routes would require construction of a bridge across the South Fork Two Medicine River. The exploratory drilling costs for either of these alternatives are estimated at one percent less than the base alternative 1A.

Alternatives 8 and 9 would require helicopters for access to the well sites during drilling, with some road construction for access to the helicopter staging areas. In discussing helicopter access, cost, technical feasibility and safety issues are considered. Appendix N provides more information on helicopter operations. The following discussions assume that the drilling project would take 2-3 years with the required window of operation. The first year would be for pad construction and drilling and the second year would be for reclamation, in the event of a dry hole.

It is estimated that either *alternative 8 or 9* would cost approximately sixty-five percent more than any of the roaded alternatives. This cost estimate does not include the additional costs that would be incurred from the imposed mitigation of hauling crews since no crew camp will be allowed, nor does it include additional costs in the event of downhole technical problems or costs of hauling water should an onsite water well prove unobtainable. In the event that oil and/or gas is found in commercial quantities, road construction would also be required at additional cost to the company.

The technical and feasibility aspects of a helicopter mobilization in the RM-1 Unit are weather and terrain, availability of water, and rig servicing without an on-site crew camp (Mitigation, Chapter V). In addition, safety of personnel must be considered in all aspects of a helicopter operation.

A large helicopter such as a Boeing-Vertol 107 or Sikorsky S64E would be used throughout the drilling operation to haul heavier payloads while a medium-sized helicopter such as a Bell 206B-III would be used primarily to ferry personnel and supplies. Helicopter operations are limited by weather primarily under conditions of high wind and poor visibility. High winds would shut down operations of small-to medium-sized helicopters but would have much less effect on operations of large helicopters (Lazzaretti, 1986, personal communication). Although large helicopters can fly under very high wind conditions, their operations become impractical when windspeeds significantly decrease their ability to fly in a headward direction. Windspeeds and gusting are limiting factors for large helicopters when they exceed the helicopters design standards for engaging (starting) and disengaging (stopping) their rotors. In general, large helicopters would be limited from engaging their rotors at windspeeds above approximately 40 to 50 mph and in some conditions of turbulence (Ramige, 1989). The Sikorsky S64E is designed to engage or disengage its rotors at windspeeds up to approximately 50 mph (Tefft, 1989). The Boeing 107 (formerly Boeing Vertol 107) is designed to engage or disengage its rotors at windspeeds up to 57 mph (Giedzinski, 1989). With the addition of gusting winds, the maximum windspeed in which rotors can be engaged or disengaged is decreased.

Seismic operations on the Rocky Mountain Front reported that wind and visibility conditions unfavorable for seismic operations occurred 48% of the time between July and October of 1983, for small to medium sized helicopters (Bureau of Land Management and Forest Service, 1985). Winds in the project area are likely to range from 5 to 15 mph with occasional stronger winds. Winds in excess of 100 mph have been reported on the east side of Glacier National Park (Finklin, 1986). For an operation such as the proposed Chevron project, helicopters would be used to stockpile some of the equipment and supplies in preparation for the periods in which helicopters could not operate. One of the primary concerns of operations in high wind conditions is for the safety of the ground personnel working with the helicopters. This safety consideration may be the limiting factor for the use of helicopters during poorer weather and high wind conditions.

Information from the National Weather Service in Great Falls, Montana indicates that ceilings of 2500 feet and visibility of greater than 3 miles (nearly visual flight range (VFR) conditions) occur for 25-28 days per month in winter and 31 days per month in summer in Billings, Montana. This indicates that approximately 83% to 93% of the days have visual flight range conditions in the Billings area during the winter months (Dougherty, 1989, personal communication). Because the RM-1 Unit, unlike Billings, is characteristically rugged and mountainous, visual flight range conditions would probably occur for a lower percentage of the time. A range of 80% to 90% of visual flight conditions days are suggested for the RM-1 Unit for the winter months. The well site may likely be inaccessible for several days at a time during low ceiling or storm conditions. Stockpiles of equipment and supplies would be made in preparation for poor weather, however, crew changes could not be made. This could impose short-term hardship on the drilling personnel and result in morale problems. In addition, if a personnel accident or an unexpected drilling problem occurred, there would exist the possibility that no transportation to and from the well site would occur for a period of several days.

An adequate drilling water supply at the well site would be critical to the proposed operation. If an on-site well could not supply the required 50 gallons per minute, helicopter supported water hauling would make the proposed project not feasible. Drilling the well would require a minimum of 1,026,900 gallons of water under ideal drilling conditions. This amount of water would weigh about 7,700,000 lbs. and the added trips would increase the helicopter costs by over 30%.

Safety is also an important factor related to water supply. A continuous water supply would be critical during the drilling period and may require greater than 20 trips per day. Very specific downhole conditions must be maintained during drilling to assure that events such as blowouts do not occur. A lack of water at a critical time could increase the risk of a blowout.

Maintaining a continuous supply of materials, equipment and personnel would be necessary to ensure a safe and efficient drilling operation. It is estimated that approximately 2300 to 4400 trips would be required to construct, drill and abandon the well site (includes personnel ferrying but not water) (refer to Appendix N). Because mitigation precludes a crew camp on-site, crews would have to be flown in on 8 to 12 hour rotating shifts. Rig personnel safety would be compromised in the event that weather prevented or delayed shift changes and delivery of supplies. In addition, significant costs would be incurred if equipment or supplies were not delivered promptly to the well site.

In the event of an accident, helicopters would be available to airlift personnel to a medical facility. This may not be the case where roaded alternatives are used. However, emergency airlift could pose a safety risk for the pilot and passengers if flight was required in adverse weather conditions (i.e., extreme wind, cloudiness). The nearest hospital is in Browning which is approximately 25 miles away.

Alternative 12 (no action) would cause no effects to the environment. However, the action would deny Chevron the opportunity to explore for hydrocarbons and obtain geologic information in conjunction with their lease.

Reasonably Foreseeable Actions

A Dry Hole

Should the exploratory hole prove dry, Chevron may desire to drill a second well to further check the geologic structure. Effects from drilling a second well would be similar to those for the exploratory hole.

Prior to approval for a second well, a complete environmental analysis would be conducted, incorporating appropriate information obtained from drilling the previous well.

A One Well Production

Under roaded *alternatives 1A,1B,2,6A,6B,7A,and 7B* the well servicing road would be available to access other leases in the area during the life of the well. This is discussed in more detail in Section IV.3. The road corridor may also be available to Chevron as a pipeline access corridor. To protect the scenic river values of the North Fork of Badger Creek, any production pipelines and roads would be installed and monitored to insure that surface disturbance, pollution, sedimentation, and visual impairment are minimized. A cumulative sediment analysis has been conducted in accordance with management standards for Scenic river areas (Forest Service, 1989).

Under *Alternatives 1A or 1B*, the temporary bottomland route used to access the exploratory well, would be vacated and reclaimed, and a permanent, long-term access road would be constructed to serve the producing well. This would increase the overall cost for either of these alternatives by about 30% over the other roaded alternatives.

Alternative 2 would provide a long term roaded access for future oil and gas activity. It would also provide access for a pipeline corridor. A lifting station could be required to pump condensate and liquids over Whiterock pass. This route would be the closest route to the Gypsy Highview sweetening Plant, should the gas need to be sweetened prior to sale. Any major production facilities for this well could be located on National Forest System lands near the Badger Cabin or on the Blackfeet Reservation southeast of Whiterock Pass (Yogerst, 1986a).

Alternatives 6A and 6B would be well-suited for development. Pipelines would likely follow the road right-of-way and avoid crossing the South Fork Two Medicine River. North-facing slopes may cause problems with snow removal and road maintenance for longer periods of time than the south-facing *alternatives 7A and 7B*.

Alternatives 7A and 7B would also be well-suited for development. Pipelines would likely follow the road right-of-way; however, it would cross the South Fork Two Medicine River. This could pose a possible pollution risk if petroleum products were spilled at or near the crossing.

Alternatives 8 and 9 would require construction of an access road to service the well. This construction would result in an approximately one year delay for production. The cost of helicopter access for exploration drilling, and road construction costs would increase costs approximately 100 percent over alternative 1A.

In summary, *alternatives 6A, 6B, 7A, and 7B* would all have similar production costs. *Alternative 2* would have a slightly higher production costs due to the need to lift liquids over Whiterock Pass. *Alternatives 1A and 1B* would have approximately a 30 percent increase in costs over the base alternative 1A (due to construction of a new access and reclamation of the original access). *Alternatives 8 and 9* would have approximately a 100 percent increase in the costs of production over the base alternative 1A, with construction of an access road to the well site.

Costs of production facilities and pipelines are expected to be comparable for all alternatives and are not differentiated in the analysis.

Under all alternatives Chevron would need access to the producing well to monitor and maintain the well and production facilities. The most likely product from the producing well would be a mixture of gas, water and condensate (light oils). The gas portion is usually light hydrocarbons and other gases such as carbon dioxide or hydrogen sulfide. The mixture would be separated at a small facility (approximately 30 ft. X 40 ft.) near each well site into its liquid and gas components (Figure 3.1). These components would then be piped in two lines to a sweetening plant where they would be further separated and impurities would be removed. Pipelines to the sweetening plant would probably require a pumping station for the liquid line and a compressor station for the gas line. All facilities along the pipeline would be constructed and muffled so as to reduce any visual and noise impacts to minimum. For further discussion on production considerations see Section III.A.

Problems that can occur from producing wells are several: 1) Corrosion of processing equipment and pipelines can occur from hydrogen sulfide and/or carbon dioxide impurities in contact with water, 2) Water in the producing fluids can freeze and crack pipelines and promote development of hydrates, and 3) Blocking or restricting of fluid flow by development of hydrates (note: hydrates are crystalline compounds that form when natural gas and water are in contact above the freezing point of water. These substances can build up in the pipeline and effectively "clog" them. Hydrates are cleaned out of pipelines by a process called "pigging").

Because of the above mentioned maintenance needs Chevron would likely want to inspect the wellhead facilities on a daily basis. Wellhead inspections are standard industry practice in producing fields. Daily inspections would occur at a wellhead until a production history has been developed and any problems have been worked out of the production facilities. This may require daily visits by 1 to 2 vehicles for the first year or two of production. After that, remote monitoring operations may be feasible and the well and facilities may be field inspected on a less frequent basis. Remote monitoring operations by Amoco in the Overthrust Belt in Wyoming have resulted in decreases in the number of wellsite visits (Ferrinbach, 1989).

Produced gas or liquids would be removed from the well sites by pipeline, truck or some some combination of both. The type of system used to remove the products would depend on the type of material produced. For whatever type of production operation, remote monitoring devices would be considered to reduce the number of vehicle trips to the well sites.

Remote monitoring involves monitoring of wellhead pressures, volumes, temperatures, and other physical conditions at a producing location from an offsite facility. The remote monitoring system is run by an electrical power source to each wellhead and also contains some type of backup power source. Remote monitoring equipment can, for example, detect pressure changes or tell if an injection tank is low on an inhibitor. However, remote monitoring equipment may not be able to distinguish if any pressure changes are the result of a pipeline leak or if the inhibitor is low because of a pumping problem. Such problems would require an on-the-ground investigation to determine the source of the indicated problem(s).

The success of a remote monitoring system depends on a number of factors, including the type of petroleum products produced and engineering and design standards used. Remote monitoring is used more effectively for dry gas than for liquid petroleum. Some types of liquids such as heavy oils, are not well suited for long distance pipeline transmission, and therefore, may be inappropriate for off-site monitoring. In these instances other mitigation may be required. This could include truck hauling with larger trucks to minimize the number of trips, or hauling at night or during periods that would minimize the effects on wildlife. This has shown to be 85% effective in reducing effects to wildlife by eliminating travel during important wildlife use periods (Williams, 1989).

A pipeline operation may result in fewer trips overall to producing wells and facilities. For the larger production set-ups it may be advantageous to develop central storage systems to avoid frequent entry into all producing units. Haul traffic would then be required to access only the central storage unit that may be located well away from important wildlife habitat. The design and location of such facilities would be dependent on the type of production anticipated. A pipeline operation would be feasible if the product contained a fair amount of condensate (light oils). If the produced product contained only a small amount of condensate, the product could be stored on-site and removed periodically by truck.

Should Chevron want to produce their well they would need to develop a production and monitoring plan that satisfies the requirements identified on their lease. This includes a responsibility to comply with requirements of the Endangered Species Act (see specifically Appendix A, page A-8). In addition, site inspections by Chevron personnel would be in conformance with other uses and values of the RM-1 Unit as much as possible. Routine inspections could be performed on ATV's in the summer and snowmobiles in winter where equipment needs are not great. Some maintenance visits would require use of larger pickup trucks.

A Field Production

Production and development of a multi-well field would require additional roads to well sites and facilities. Feeder pipelines, storage and treatment facilities, and attendant monitoring systems would also be required for any other wells within the field. As discussed under the One Well Production Scenario the investment made in the initial road and development facilities would contribute to an overall development strategy for future activities. This is discussed in more detail in section IV.3.

B. WATER RESOURCES

This section discusses the effects on the water resources. Several issues were expressed during the scoping process related to whether water quality would be adversely impacted by a drilling operation (both surface and ground water). The issues were as follows:

(1) Water quality could be adversely affected, and involves surface water and ground water (including rate of movement and quality).
(2) Drilling fluids could contain certain constituents that could affect the subsurface environment and hydrology.
(3) Rupture of a pipeline could contaminate streams and water supply for downstream users.
(4) Reduction of water quality could result from sedimentation, siltation, runoff, and erosion potential of unstable soils due to road construction.
(5) Increased sedimentation from road construction could impact riparian habitat. Wetlands and floodplains are discussed in section IV.1.J-Vegetation.

The discussions of effects on water resources are divided into subsections on surface water, ground water, and water use. Effects on surface water include the increased sediment transport resulting from construction-related activities. Effects on groundwater include pollution from surface contaminants such as oil or petroleum-based products, contamination from the drill hole, and extraction from a water well. Effects from water use include the amount of water needed and the potential hazards to groundwater. Management practices and guidelines commonly used to mitigate activities that may affect water quality are given where appropriate. These are discussed in greater detail in Chp. V-Mitigation and Monitoring, Water Resources and Fisheries.

Exploration Proposal

a. Surface Water

The effects on water quality are compared on the basis of the cumulative increases in sediment produced above the natural sediment yield. Table 4.1 lists the estimated sediment yield for each of six watersheds above critical stream reaches potentially affected by proposed drilling. This information was generated from a sediment model developed for Forest Service Region 1 and Region 4 (Cline et al., 1981). The value of the estimates is limited to providing a basis of comparison between alternatives because of the low accuracy of the coefficients used in the model.

The estimates are based on a five-year period that starts with road construction. An assumption was made that best management practices and guidelines, described later in this section would be implemented.

The data in Table 4.1 indicate that the percentage increase in sediment likely to result from road and drill pad construction, as compared to natural erosion, would not be measurable on an annual basis. Changes of ten percent or more can only be measured with an intensive and expensive sampling program over several years. The largest estimated sediment yield increase is 1.6% above natural (0.8% above that presently occurring from existing roads). These estimations indicate that sediment created from road construction for exploratory drilling would be low. Current estimates shown in Table 4.1 indicate that several times the amount of presently estimated sediment yield increase would be necessary before a measurable impact would occur downstream.

Intensive measurement, with a weir or a flume, a settling pond on a small stream, or a bridge on a large stream may indicate slightly higher sedimentation rates, but should not be significantly higher.

Estimated sediment yield increases are low because a single road would transverse each watershed in an area with a very high natural sediment yield. Natural sediment production level because the area is "geologically young", with many steep slopes and shallow or unstable soils. As a result, high stream turbidity occurs for several days or even weeks during peak snowmelt, after heavy spring rains, and after intense summer thunderstorms.

Summer thunderstorms during road construction could cause a large, short term increase over the natural sediment yield. This amount would likely be immeasurable when compared to total annual yield of sediment, when all reasonable conservation practices are used, as required by State Water Quality Standards (Administrative Rules of Montana, Rule 16.20.618). This short-range impact can also be mitigated through practices given in this section.

Alternatives 8 and 9 would not have enough road construction to provide a reportable increase in sediment yield.

For *alternatives 1A, 1B, 2, 6A, 6B, 7A, and 7B*, segments of the road construction mileage is across soils composed of glacial till (landtypes 22, 25C, and 177). These landtypes are rated as having a severe cutbank failure hazard for roads constructed in deep, clayey soils (Holdorf, 1981). This means that roads constructed on slopes with evidence of mass failure in the geologic past and high evidence of ground water concentration could result in mass instability on road cut and/or fill slopes. A cutbank failure could affect sediment yield if it occurred near a stream. There is presently no reliable method for estimating the quantity or frequency of mass failure that may occur, nor the proportion of soil material that could be delivered to a nearby stream. The following table shows the length of area in which roads are likely to be affected by potentially unstable landtypes.

Alternative	*Miles*	*% of Distance*
1A	8.3	44%
1B	6.7	38%
2	2.8	14%
6A	11.5	66%
6B	10.3	60%
7A	10.3	55%
7B	8.7	50%
8	1.0	100%
9	0.0	0
12	0.0	0

The mass failure hazard potential can be reduced by locating roads to avoid the hazard, by not constructing roads across steep slopes, and by keeping cut slopes under ten feet in height. Special care should be taken at stream crossings and any areas of high water table in the three landtypes.

Water quality protection is governed by the Forest Plan and by State water quality standards. These standards require that all reasonable land, soil and water conservation practices (referred to as Best Management Practices) must be applied to any land management activity (nonpoint source pollution). Good drainage with plenty of cross-drains on roads and trails is the basic necessity.

The analysis of cumulative increases in sediment yield (Cumulative Sediment Analysis) indicates that relatively small increases would be expected for the portion of North Badger Creek that is eligible as a scenic river (Table 4.1, watershed 1). These estimates also include Red Poacher Creek. The estimated increase in sediment yield over natural levels is 0.8% for the roaded alternatives and 0.3% for the helicopter alternatives. The effects of any changes in surface water quality with regards to the outstanding fisheries resource value of North Badger Creek is discussed in section IV.1.H-Fisheries.

Table 4.1
Estimated Percent Sediment Yield Increase Over Natural Levels

Alternative	*Watershed**							
	1	*2*	*3*	*4*	*5(a)*	*5(b)*	*6*	*tons*
1A	0.8	1.0	1.5	1.0	0.8	0.8	0.8	13.9
1B	0.8	1.0	1.5	1.0	0.8	0.8	0.5	15.0
2	0.8	1.1	1.5	1.6	0.8	0.8	0.5	18.1
6A	0.8	1.1	1.5	1.0	0.6	0.7	0.8	11.3
6B	0.8	1.1	1.5	1.0	0.7	0.8	0.5	12.9
7A	0.8	1.0	1.5	1.0	0.7	0.7	0.8	13.3
7B	0.8	1.0	1.5	1.0	0.7	0.8	0.5	14.5
8	0.3	0.0	1.5	0.8	0.6	0.7	0.5	
9	0.3	0.0	1.5	0.8	0.6	0.7	0.5	
12	0.1	0.0	1.5	0.8	0.6	0.7	0.5	

The identified watersheds cover the following drainages: (refer to Map 3.3 for locations) Watershed 7 is discussed in section IV.2.B.

1. North Badger Creek to and including Red Poacher Creek.
2. North and South Badger Creek.
3. North Fork Little Badger Creek above the Forest boundary.
4. South Fork Two Medicine River to and including Lost Shirt Creek.

5(a) South Fork Two Medicine River above private land (without Hall Creek APD road construction).
5(b) South Fork Two Medicine River above private land (with Hall Creek APD road construction).
6. Summit Creek above campground.

* Estimated average annual sediment yield from roads during first five years of construction, in all watersheds.

The percent shown for "no action" *alternative 12* reflects current sediment increases from existing roads above natural levels of sediment yield.

NOTE: The total average annual sediment yield increase shows percent change for all roads in each watershed identified.

The use of slash filter windrows, as required by the management standards in the Lewis and Clark National Forest Plan (Forest Service, 1986a), can reduce sediment entry into nearby streams by about 75 to 85% (Cook and King, 1983). Care must taken to construct the slash filter windrows to effectively filter sediment without inhibiting passage of wildlife or creating a fire hazard. Use of the slash filter windrows is most beneficial near water courses. Some modification of slash filter windrows may be needed where high scenic values exist. The filter strips add little to the cost of construction.

Road surface aggregate would be used on soils with high erosion potential to reduce sedimentation, control surface run-off, and abate road dust. Additional mitigation measures, beyond required Best Management Practices, include the closure and restoration of old roads in the area, the use of lined diversions for any culvert installations at live water crossings, and the use of rock riprap at culvert outlets. Bridges would be constructed at major crossings of the South Fork Two Medicine River and North Badger Creek (refer to Section IV.1.D-Acess Management).

Basic revegetation guidelines and other provisions of the Soil and Water Conservation Practices Handbook (Forest Service, 1988b) are required. The evaluation of sediment, as given above, with the accompanying fisheries evaluation, is used to determine that beneficial uses of the water (notably fish habitat) are not adversely affected by the cumulative effects of these practices. Finally, monitoring must be in place to determine if the prediction of these cumulative effects is reasonable and if the water quality goals and beneficial uses are indeed being protected. Monitoring is discussed in Chapter V.

b. Ground Water

Drill fluids could become a source of contamination for either surface or ground water. The company would not be allowed to use chemicals that are considered hazardous under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). Drilling muds at the surface would be contained in a lined reserve pit. Upon completion of the drilling operation, the drilling muds could be disposed of at an approved disposal site. Any toxic drilling muds would be disposed of at an approved EPA site for disposal.

Non-toxic liquids remaining in the reserve pit after completion of the well could be allowed to evaporate, or be injected into a safe subsurface formation. As expressed previously in this section, the Conditions of Approval to Drill (Appendix B) prohibits the use of any toxic chemical while drilling, as defined by the CERCLA. If a request to use toxic materials in the drilling muds was submitted, the company would be required to supply an inventory of all the drilling muds used, and the muds would have to be removed and disposed of at a waste facility site approved by the Environmental Protection Agency (IM-MT-86-208). Chevron has indicated in a letter to the Forest Supervisor (Chevron, 1987) that it has no plans to use toxic materials in the drilling muds.

Contamination of groundwater from surface activities could occur if a blowout occurred during drilling. A well blowout could allow well fluids and associated contaminated water to escape and possibly enter local groundwater aquifers. As described in Section IV.1.O. Health and Safety, the probability of an accidental release (blowout) during drilling would be very low. Department of Interior Notice to Lessees (NTL) 2B outlines requirements for the disposal of any water produced from oil and gas wells, including salt water.

Drill fluids could enter aquifers and degrade the groundwater quality, primarily while drilling the hole to the depth at which the surface casing would be set. This would cause a localized effect, or a halo around the drill hole. Only fresh-water drilling muds would be allowed when drilling through horizons that contain fresh water. Salt-based muds could be used when drilling through salt-bearing horizons, however, these type of horizons are very unlikely in this area. During drilling, fluid levels would be routinely monitored. If fluids were escaping, material would be added to plug the formation and prevent any widespread degradation of groundwater.

The project casing and drilling program would be reviewed and inspected to ensure the protection of fresh water zones and to ensure the cementing of casing is adequate to the surface or covers any usable or producible formations. Casing grades and weights must be adequate to withstand pressures and must be rated to work in the environments that they will be exposed to. Well casing would be set to a depth necessary to prevent interception of groundwater and intermingling of groundwater from one formation to another. Aquifers would be cemented off and isolated during the abandonment phase to prevent intermixing of groundwater from one formation to another.

c. *Water Use*

Chevron's Surface Use Plan (Appendix B) specifies that water needed for the drilling operation would be obtained from a water well proposed near the drill site or from a local off-site source. Water use would not be expected to exceed 50 gallons per minute (Chevron, 1987). A well of this size should not cause a measurable withdrawal from the available groundwater and would not be a pollution hazard to the groundwater.

A Notice of Completion of Groundwater Development, filed with the Montana Department of Natural Resources and Conservation, is required for the right to withdrawal water up to 100 gallons per minute.

In the event well water would not be available in adequate quantities at the drilling site, Chevron would seek an alternate water source, available only through purchase from an existing water-right holder. Sources of surface water could include the North Fork of Badger Creek or the South Fork Two Medicine River. Drilling the exploratory well would require a minimum of approximately 1,026,900 gallons (24,450 barrels) of water. If circulation liquid was lost during drilling, the amount of water required could increase substantially.

A water truck, depending on its capacity, could carry from 50 to 200 barrels (2,100 to 8,400 gallons) per trip, and would require from 590 to 1,200 trips to haul in the required water supply. The cost to haul water under helicopter *alternatives 8 and 9* would make the operation unfeasible (See Section IV.1.A for more information on hauling water with helicopters).

Alternative 12 (no action) would cause no change, so there would be no effects.

Reasonably Foreseeable Actions

A Dry Hole

Effects from drilling a second hole to check the geologic structure would be very similar to those described for the exploration proposal. Chevron would need additional water for the second well in similar amounts as described previously. Any additional road construction would be subject to the management standards and construction guidelines described for the exploration proposal.

A One Well Production

a. *Surface Water*

For *alternatives 1A, 1B, 2, 6A, 6B, 7A, and 7B*, sediment yield would be highest during the first one to two years following road construction, while the roadbed, cuts and fills are stabilizing. The yields in Table 4.1 include this increase. Following the first two years, sediment yields will stabilize or decrease. This would include any effects of sediment yield on North Badger Creek.

Should a pipeline be constructed to transport the well production, the sediment yield would approximate that produced from road construction. A pipeline crossing streams would be an unavoidable contributor to sedimentation but could be largely controlled by providing drainage to sediment traps or filter areas, particularly on approaches to stream crossings. All areas with soil disturbed during pipeline construction would be revegetated.

For *alternatives 8 and 9*, it would be necessary to construct an access road for servicing the well. Sediment yield would be the same as indicated for the exploratory roaded alternatives. Sediment yield would be highest during the first 1 to 2 years and would lower as the road stabilizes. Should a pipeline be required, the sediment yield would approximate that produced from road construction. Any construction of pipelines at stream crossings would be accomplished in a manner similar to the other alternatives.

The risk of an oil spill, either from a pipeline rupture or leak, or from a tank truck could occur should oil be produced. This would present a hazard to the local fishery, downstream irrigation, and the domestic water supplies of residents using the South Fork Two Medicine River and North Badger Creek. Potential effects of water quality degradation on the fisheries resource of North Badger Creek is discussed in Section IV.1.H-Fisheries. A contingency plan would be developed to provide a rapid response should a spill occur (Forest Service, 1986). Pollution from an accidental oil spill would continue to be a hazard as long as petroleum was transported from the area, either by pipeline or by tank truck.

b. Ground Water

The risk of a pipeline rupture is small. Any rupture would require the area to be cleaned-up and contaminated soils removed. There would be a risk of groundwater contamination. The spill cleanup contingency plan would address the steps to be taken to prevent or minimize groundwater contamination.

c. Water Use

No large quantities of water use would be necessary for a producing well.

A Field Production

a. *Surface Water*

The sediment yield would increase with additional road use and more access roads. The amount of this increase would depend upon the length of road and location of the wells. There would have to be a large increase in road mileage before a measurable increase of sediment (10 %) would occur. The effects of increased sediment yields on the fisheries resource of North Badger Creek are discussed in Section IV.1.H-Fisheries. Disturbances in sensitive landtypes (25, 25C, and 171) would cause the greatest sediment yield increase. Additional pipeline construction and maintenance could add some additional sediment. The increased sediment production would decrease after construction is completed, but would continue to occur at low levels until roads and drill pads were closed and completely reclaimed.

The potential for oil spills and/or pipeline ruptures would be similar to that discussed for one well. With additional wells and feeder pipelines, there would be an increase in the risk of a spill or rupture occurring.

b. Ground Water

The effects of drill fluids, drilling muds, and liquids remaining in any reserve pits would be similar to those discussed for the exploration proposal and one well production scenarios. The handling and disposal of all fluids, muds, and liquids would be the same as for the exploration proposal.

Contamination from a blowout would be similar to that discussed for the exploratory proposal. The probability of an accidental release during drilling would be very low.

Requirements for the handling and disposal of water produced from oil and gas wells, including salt water would be the same as for the exploratory proposal and for the one well production.

The effect of drill fluids entering aquifers and degrading water quality would be the same discussed for the exploratory proposal. With additional wells, the risk would be present for each well drilled.

c. Water Use

The need for water during the drilling of additional wells would be approximately the same for each additional well as discussed for the exploratory proposal. Additional water wells may be required for drill sites that are not within the immediate vicinity of previously drilled wells. If groundwater aquifers were not available, surface water sources would be utilized. Each additional water source would require a separate filing for a water right.

C. AIR QUALITY

During the scoping process, four concerns were raised about the effects of the proposed activity on air quality. The four air quality concerns were: 1) effects during road construction, 2) effects of traffic and associated road dust, 3) effects of emissions of burning slash or other materials, and 4) potential effects of hydrogen sulfide gas exposure potential during drilling.

This section of the analysis examines the possible effects on air quality within and adjacent to the project area that would result if the projects were carried out for the alternatives being considered. The effects from possible production of either well are considered. Mitigation measures, as applicable, are also included.

Exploration Proposal

a. Road Construction and Dust Considerations

Alternatives 1A, 1B, 2, 6A, 6B, 7A, and 7B would involve road construction through several geologic formations of mudstone and siltstone that may be prone to dust emissions from heavy vehicle use during dry months. Fugitive dust and vehicle emissions would be expected to increase from present levels. A suitable surfacing material or other dust abatement measures (i.e. dust suppressing chemicals or watering) would be necessary in these areas during dry months. Control of vehicle speed could also reduce fugitive dust by 20-50% (Environmental Protection Agency, 1977), as could car-pooling. Road closures to all except project and administrative personnel would minimize traffic and the associated dust problems.

Chevron has submitted a log of typical well site traffic. The median number of trips required during the winter months would be about 15 per day (crew camp) and about 20-25 per day (no crew camp). These trips would include drilling company and industry personnel, federal personnel, and support services, i.e., fluids control, tool servicing, fuel supply, hydrogen sulfide safety engineers, mud supplies, water hauling, septic disposal, corrosion control, road maintenance and others. The number of trips could vary from 4 to 37 per day depending on circumstances at the drill site. Drilling activity would be conducted 24 hours a day with three shift changes.

Particulate levels would not be expected to be greater than those established by the Montana Department of Health and Environmental Sciences Air Quality Bureau.

Alternatives 1A, 1B, 6A, 6B, 7A, and 7B would be located in stream valleys, with the potential for odors and dust to accumulate during periods of low winds. Dust could accumulate in watersheds if there is no vegetative screening from the road. Dust control measures would also be in effect in the vicinity of North Badger Creek to protect the outstandingly remarkable fisheries value. The effects of dust and other sediment sources to

North Badger Creek have been analyzed in Section IV.1.B-Water Resources. Chapter V-Mitigation and Monitoring, lists mitigation measures that would help control dust.

Dust may be noticeable to individuals visiting or recreating in the Summit Campground area under *alternatives 1A, 6A, and 7A*. All appropriate mitigation measures will be implemented to limit odor and dust accumulations (See Chp.V-Mitigation and Monitoring).

Alternative 2 would have similar effects on air quality as those described for the other roaded alternatives, except there would be no stream areas affected.

Alternatives 8 and 9 would have vehicle emissions and fugitive dust in conjunction with the activity at the staging areas. Prop wash from helicopters could create significant amounts of dust at staging areas, and dust abatement measures would be required. Winds at flight levels should dissipate most helicopter emissions.

Alternative 12 (no action) would result in no change, so there would be no effects.

b. Emissions

Combustion emissions from drilling activities could include oxides of nitrogen, carbon, and sulfur. Drilling rigs, of the type typically used in the Overthrust Belt, would be exempt from requiring a Prevention of Significant Deterioration (PSD) air quality permit under the Montana Air Quality Rules (16.8.1102k(ii)) because emission concentrations (particularly sulfur dioxide) would not exceed the national air quality standards.

Trash would either be incinerated daily or removed from the site. Particulate matter emitted, and closed incineration vessel design, shall comply with Montana Department of Health and Environmental Sciences Standards.

c. Hazardous Gases

All action alternatives would result in drilling and would present the possibility of hazardous gases escaping to the surface. Certain hazardous gases such as hydrogen sulfide and/or carbon dioxide could be present in varying concentrations in the rock formations at depth. Hydrogen sulfide is a colorless, highly toxic, flammable gas, sometimes encountered in lethal concentrations with methane in oil and gas wells. The hydrogen sulfide concentrations that may be encountered are estimated to be approximately 0.4%, similar to the concentrations found by drilling in the Blackleaf Canyon area (Map 3.1). The expected similarity in hydrogen sulfide concentrations is due to the similarity in rock formations that are found in the two areas. High hydrogen sulfide concentrations are related to anhydrite formations which are uncommon in the northern Montana portion of the Overthrust Belt. Drilling in the Blackleaf Canyon area has not revealed the presence of anhydrite interbedded with the Madison Group formations. Refer to Section IV.1.O-Health and Safety for more information on hydrogen sulfide and other gases.

Gases could escape during drilling through the well bore, through pipe fittings, or as a result of an accidental blowout. Most cases of blowouts occur during "trips", (pulling of drill pipe from a wellbore or running a pipe into the well). Blow-out preventers would be required to ensure proper control of the well when drilling. The Blow-out preventers and their use would be the key factors in controlling "kicks" and insuring no blowouts occur.

An accidental blowout could pollute the air with: 1) natural gas containing hydrogen sulfide, 2) a gas composed primarily of carbon dioxide with minor hydrogen sulfide and methane, or (3) sulfur dioxide and other combustion by-products resulting from ignition of a gas composed mainly of methane. Hazardous gases are discussed in Section IV.1.O - Health and Safety.

Alternative 12 (no action) would cause no change, and would create no effect from hazardous gases.

Reasonably Foreseeable Actions

A Dry Hole

The air quality effects due to road construction, dust, emissions and hazardous gases caused by drilling a second well, should the first hold prove to be dry, would be similar to those discussed for the exploration proposal. Any effects would be extended for the period of time required to drill the second well. Mitigation and monitoring measures, similar to the exploration proposal would be in effect throughout the operation.

A One Well Production

The effects on air quality from road construction and dust generation would decrease upon completion of road and well pad construction for *alternatives 2, 6A, 6B, 7A, and 7B*. Additional construction and dust generation would occur if a pipeline is constructed. The air quality effects would decrease upon completion of the pipeline construction. Revegetation will stabilize disturbed areas and help control dust generation. In the event that hydrocarbons are transported from the wellsite by truck, dust abatement measures would be required during dry months.

Under *Alternatives 8 and 9* and *alternatives 1A and 1B*, it would be necessary to construct an all-weather road and pipeline corridor as discussed for the access road alternatives. The effects on air quality would occur during the period of construction of the road and pipeline and would be similar to those discussed for *alternatives 2, 6A, 6B, 7A, and 7B*.

Emissions would probably not change significantly from exploration drilling conditions. Additional emissions will be generated during any further construction, however, the emissions associated with the drilling rig will be gone. Emissions would only occur from periodic well visits once construction is completed and the well is producing.

There is a possibility that gas emissions could occur from ruptured pipelines or poor pipe fittings. Proper engineering of pipelines and facilities, including check valves in transmission pipelines, would reduce the volume of emissions. Close monitoring of pipelines and facilities would mitigate this possible problem. Dust emissions and other particulate matter will be minimized by access restrictions (refer to Chp.V-Mitigation and monitoring). Particulates from incineration at the site would be less than during exploratory drilling.

Because of the extreme toxicity of hydrogen sulfide, monitors would be installed in the well and special safety precautions followed. These measures are discussed in more detail in Section IV.1.O-Health and Safety.

Should sour gas (gas containing hydrogen sulfide) be produced, the hydrogen sulfide would have to be removed before the gas entered a commercial pipeline. To achieve this, a gas sweetening plant would be built on or near a gas transmission line. Elemental sulfur could be produced if quantities of hydrogen sulfide are high enough. The hydrogen sulfide could also be removed from the gas and reinjected into the producing formation to enhance production. If sour gas occurred in quantities insufficient to justify sweetening, the gas would be reinjected. A producing oil well containing dissolved hydrogen sulfide would present a hazard should leaks develop in the production or sweetening system. Any proposal for a gas sweetening plant in the study area would require further environmental analysis.

A Field Production

The amount of road construction and dust generated would be dependent on the distance between wellsites. Dust levels would be expected to increase in the areas of road construction during construction phases. Most of the road constructed for the one well production scenario would be utilized for access to additional wells. Dust generation would decrease upon completion of construction. Mitigation measures for construction and dust abatement that were outlined in the exploration proposal would be in effect throughout the life of the wells.

Emissions from drilling activity and field production activity could be occurring at the same time (see discussion for exploration proposal and for one well). These combustion emissions are not expected to exceed national air quality standards.

Trash would either be incinerated every day or removed to an approved disposal facility. Allowable levels of particulate emissions and the design of an incineration vessel would comply with the standards of the Montana Department of Health and Environmental Sciences.

During development of the field, the possible effects of hazardous gases would remain a risk, similar to those discussed for the exploration proposal and one well. The risk of an accidental blowout would continue until all wells had been drilled. Standard precautionary measures for blowout prevention would continue until all wells have been plugged. Hazardous gasses are discussed more thoroughly in Section IV.1.O-Health and Safety.

D. ACCESS MANAGEMENT AND RECLAMATION

Several issues were received during the scoping process regarding road building activities:

1. How will the additional access be managed to accommodate other resources and uses besides the oil and gas activities?
2. How and what areas of disturbance will be reclaimed following completion of the project?

This section discusses the current management direction for the road and trail systems in the RM-1 Unit, the effects that each alternative would have on this road and trail system if implemented, and the reclamation strategy for the various alternatives following completion of the drilling project. Table 4.2 provides a summary of how the various alternatives relate to the existing road and trail system in the RM-1 Unit. Map 3.5 shows locations of the roads and trails discussed in this section. All of the alternatives which require accessing the proposed Chevron exploration well site would involve road building activities to some extent. The mitigation measures described in Chapter V would be required to minimize the effects.

Exploration Proposal

a. Management Direction

The Lewis and Clark National Forest Plan provides the guidelines for road management in the RM-1 Unit. Access routes to the Chevron well site would cross three management areas (E, F and G) in the RM-1 Unit (See Appendix C, Management Areas). Management Area H, as shown in the Forest Plan, is specific to the recreation complex area at Summit, and is outside of the area crossed by access routes, so will not be discussed further.

Management direction for roads in Areas E, F, and G is stated: Roads constructed for (mineral exploration and development, mineral use, subsurface resource use) will (usually) be closed to public use and obliterated when no longer needed. Closures and restrictions may be used to: 1) resolve user conflicts, 2) promote user safety, and 3) protect resources. Road closures may also be used to protect important wildlife habitat (Lewis and Clark National Forest Plan, 1986a, pp. 3-27 to 3-35). All road alternatives would provide access into portions of the RM-1 Unit not previously available for vehicle travel. Helicopter alternatives 8 and 9, and alternative 12 would result in no change in road management strategy.

b. Effects on the State/Reservation Transportation System

Alternatives 1A, 1B, 6A, 6B, 7A, 7B, and 8 enter and exit the RM-1 Unit via US Highway 2. The increase in traffic volume during drilling should not affect traffic flows on US Highway 2 (current traffic volumes of 800 to 1000 vehicles per day). Some type of warning sign could become necessary to warn users of US Highway 2 of the increase in the number of vehicles entering and exiting the highway.

Under *Alternatives 2 and 9* project related traffic would enter and exit the area via the Bureau of Indian Affairs (BIA) road system. These routes require crossing the Blackfeet Reservation. BIA 2 and BIA 141 are public roads available to access National Forest lands. These roads are subject to user requirements specified by the Bureau of Indian Affairs. The increase in traffic volume during drilling should not affect the present traffic flows on BIA 2 or BIA 141. Design standards on BIA 2 are more than adequate to accommodate the additional traffic. BIA 141 would be reconstructed between its intersection with BIA 2 and the Forest Boundary. Reconstruction work would consist of defining the road prism, constructing turnouts, and applying surfacing material to minimize sedimentation and promote user safety. There would be some inconvenience to road users during the period of construction.

c. Effects on the National Forest Transportation System

Required road construction and reconstruction for each alternative is described in Table 4.2. Under *alternatives 1A, 6A, and 7A*, the lower 1.5 miles of Pike Creek Road No. 8958 would be reconstructed to accommodate the greater volume of traffic, and the large trucks. Reconstruction measures would consist of the following items:

1) Minimum travel-way of 14 feet.
2) Turnout construction at maximum spacing of 1000 feet.
3) Alignment changes for improved sight distance.
4) Additional curve widening compatible with the tracking characteristics of a "lowboy" hauling oil drilling equipment.
5) Reconstruction of the existing roadway prism to improve surface drainage.
6) Stabilization of the roadbed by the application of surfacing (gravel).
7) Seeding and mulching as appropriate to minimize erosion.

Under *alternatives 2 and 9* the Palookaville Road 9128 would be substantially reconstructed. Some road relocation would be required to eliminate excessive grades. Reconstruction would be according to the standards described above for Pike Creek Road 8958.

With the exception of *alternatives 9 and 12*, some new construction would be required for all alternatives. Proposed miles of new construction for each alternative is shown in Table 4.2. The recent publication, Surface Operating Standards for Oil and Gas Exploration and Development (Forest Service and BLM, 1989) contains design considerations and criteria for new roads constructed for oil and gas activity. In general, oil and gas exploration roads must be designed to accommodate the use of heavy, extended length "low-boy" type vehicles used to transport disassembled drill rigs. Use during adverse weather conditions would also require surfacing materials (gravel) to minimize sedimentation, minimize erosion of the roadway, and provide a safe roadway during slippery conditions.

Table 4.2
Chevron Project
Summary of Road Access Effects in Trails and Mitigation Options

Alt.	Alternative Access Proposal	Effects on Existing Trails	Mitigation Options
1A	1.5 miles of Pike Creek Road 8958 would be reconstructed.	No effects on trails.	
		Access road would cross Two Medicine-Elk Calf Mountain NRT 133 in approximately 2 locations before So. Fk. Two Medicine River bridge.	Relocate approximately 1/2 mile of NRT 133 to avoid 1 trail crossing. One crossing can not be avoided.
	17.3 miles of road access from Pike Creek Road 8958 to drilling site would be new construction	Approximately 6 miles of Two Medicine-Elk Calf Mountain NRT 101 would be obliterated by road construction.	Relocate approximately 6 miles of NRT 101 obliterated by access road.
		Approximately 3 miles of Trail 101 would be obliterated by road construction.	Relocate approximately 3 miles of Trail 101 obliterated by access road.
		Approximately 2.5 miles of Trail 103 would be obliterated by crossings or by road construction between Badger Cabin and drilling site.	Relocate approximately 2.5 miles of Trail 103 obliterated or crossed by access road.
		Approximately 1 mile of Trail 144 would be affected by road crossings between Badger Cabin and drilling site.	Relocate approximately 1 mile of Trail 144 to avoid crossings by access road.
1B	The entire 17.6 miles of road access from US Highway 2 to drilling site would be new construction.	Would cross Two Medicine Elk Calf Mountain NRT 133 in approximately 3 locations before So. Fk. Two Medicine River bridge.	Relocate approximately 1 mile of NRT 133 to avoid 2 crossings. One crossing can not be avoided.
		Effects on NRT 101, and Trails 101, 103 and 144 would be the same as listed for Alternative 1A.	Mitigation of NRT 101, and Trails 101, 103 and 144 would be the same as listed for Alternative 1A.

Alt.	Alternative Access Proposal	Effects on Existing Trails	Mitigation Options
2	5.2 miles of BIA Road 141 would be reconstructed on present location.	No effects on trails.	
	14.9 miles of road, including Palookaville Road 9128, would be new construction or substantial reconstruction of existing roadway.	Vehicle access presently controlled by locked gate at Whiterock Pass.	
		Crosses Two Medicine Trail 101 near Badger Cabin.	Crossing can not be avoided.
		Trail 102 would be crossed in 2 locations between Whiterock Pass and Badger Cabin.	Relocate approximately one mile of Trail 102 to avoid crossings.
		Effects on Trail 103 and 144, between Badger Cabin and drill site, would be the same as listed for Alternative 1A.	Mitigation of Trails 103 and 144 would be the same as for Alternative 1A.
6A	1.5 miles of Pike Creek Road 8958 would be reconstructed as in Alternative 1A.	No effects on trails.	
	16.5 miles of road access from Pike Creek Road 8958 to drilling site would be new construction.	Would cross Two Medicine-Elk Calf Mountain NRT 133 in 1 location, between Benson Creek and Badger Cabin.	Trail crossings can not be avoided.
		Would cross Trail 137 in 1 location.	Crossing can not be avoided.
		Approximately 1/4 mile of Trail 103 would be obliterated by road construction.	Relocate approximately 1/4 mile of Trail 103 obliterated by access road.
		Effect on Trail 144 would be the same as for Alternative 1A.	Mitigation of Trail 144 would be the same as for Alternative 1A.
6B	The entire 17.2 miles of road access from US Highway 2 to drilling site would be new construction.	Would cross Two Medicine-Elk Calf Mountain NRT 133 in 3 locations south of US Highway 2.	Crossing can not be avoided.
		Effects on NRT 137, and Trails 103 and 144 would be the same as listed for Alternative 6A.	Mitigation of NRT 137, and Trails 103 and 144 would be the same as listed for Alternative 6A.

Alt.	Alternative Access Proposal	Effects on Existing Trails	Mitigation Options
7A	1.5 miles of Pike Creek Road 8958 would be reconstructed as in Alternative 1A and 6A.	No effects on trails.	
	17.1 miles of road access from Pike Creek Road 8958 to drilling site, to be new construction.	Would cross Two Medicine-Elk Calf Mountain NRT 133 in 3 locations, as listed for Alternative 1B.	Mitigation for NRT 133 would be the same as listed for Alternative 1B.
		Trail 170 would be crossed in one location near junction with Trail 101.	Crossing can not be avoided.
		Approximately 1 mile of Trail 101 would be obliterated by access road.	Relocate approximately 1 mile of Trail 101 obliterated by access road.
		Trail 102A would be crossed near Whiterock Creek.	Crossing can not be avoided.
		Trails 101, 102 and 103 could be crossed near common junction.	Construct access road to avoid crossing Trails 102 and 103 in this area.
		Effects on Trails 103 and 144, between Badger Cabin and drilling site, would be the same as listed for Alternative 1A.	Mitigation of Trails 103 and 144 would be the same as for alternative 1A.
7B	The entire 17.4 miles of access road from US Highway 2 to drilling site would be new construction.	Effects on Two Medicine-Elk Calf Mountain NRT 133 would be the same as listed for Alternative 1B.	Mitigation of NRT 133 would be the same as listed for Alternative 1B.
		Effects on Trails 101, 102A, 102, 103, 144 and 170 would be the same as listed for Alternative 7A.	Mitigation for Trails 101, 102A, 102, 103, 144 and 170 would be the same as listed for Alternative 7A.
8	Approximately 1 mile of access road from US Highway 2 to helicopter staging area would be constructed.	Helicopter flights would cross Two Medicine-Elk Calf Mountain NRT 133, and may be seen and heard from other trails in the Two Medicine River drainage.	Effects of sight and noise from helicopter fly-overs cannot be avoided. Staging area could be moved to be accessed from Pike Creek road No. 8958, to avoid flights over NRT 133.
9	5.4 miles of existing road to the Palookaville staging area would be reconstructed.	Helicopter flights could be seen and heard from trails near Whiterock Pass and Badger Cabin area.	Effects of sight and sound from helicopter flights can not be avoided, but could be reduced by a flight line well east of Whiterock Pass.

Design criteria for new road construction would consist of the following:

1) Design speed of 10 - 15 MPH.
2) Minimum travel-way of 14 feet.
3) Sustained Road grades should not exceed 8%; however, brief pitches up to 10% would be acceptable in situations where special design considerations are implemented.
4) Turnouts would be constructed intervisibly where adequate sight distance is not provided.
5) Drainage crossings would consist of removable bridge decks with abutment construction located back from the banks of identified fisheries to minimize sedimentation.
6) Filter windrows would be constructed along the fill sides of the roadway to minimize sedimentation where necessary. Seeding and mulching would be conducted as appropriate to minimize erosion.

All Chevron roaded alternatives would require crossings of the North Fork of Badger Creek, which is subject to regulation that the Secretary of Agriculture may prescribe to protect "outstandingly remarkable" fishery values. Mineral operations must be conducted in a manner that minimizes surface disturbance, sedimentation, pollution, and visual impairment pending designation under the Wild and Scenic Rivers Act. This is discussed in detail in Section IV.1.J.

d. Effects on the Existing Forest Trail System

Effects of roaded access on individual trails, and trail mitigation, including trail relocation and project avoidance, is summarized in Table 4.2. *Alternatives 1A and 1B* would have the greatest impact on the Forest Trail System. The proposed roads under these two alternatives would generally follow the location of the South Fork of Two Medicine Trail 101, from the Two Medicine River crossing to the Badger Cabin location, for approximately 9 miles. The proposed road location would also follow the location of Trail 103, from the Badger Cabin to the North Fork of Badger Creek, for a distance of approximately 2.5 miles. The proposed road would cross Trail 144 two times between Badger Creek and the drill site. For *alternatives 1A and 1B,* approximately six miles of the Two Medicine-Elk Calf Mountain NRT 101, three miles of the Two Medicine Trail 101, and 2.5 miles of Trail 103 would be obliterated by construction of the access road. These trails could be relocated to avoid conflicts with trail users and drilling traffic. Where crossings of Trails 103 and 144 occur, the trails could be relocated to avoid the crossings.

In addition, *Alternative 1B* would cross the Two Medicine-Elk Calf Mountain NRT No. 133, and possibly obliterate a portion of the Trail. Approximately one mile of the NRT 133 could be relocated away from the access road. The one crossing near the South Fork of Medicine River crossing could not be avoided.

Alternative 2 would cross Whiterock Trail 102 at two locations between Whiterock Pass and Badger Cabin. Between Badger Cabin and the drill site, the road would affect Trails 103 and 144, as described for alternatives 1A and 1B. Approximately one mile of Trail 102 could be relocated to avoid the crossings. Access could be provided to the Woods Creek Trail.

Alternative 6A would cross the Two Medicine-Elk Calf Mountain NRT 137 at two locations between Pike Creek and Badger Cabin. Provisions would have to be made to construct safe crossings for users of Trail 137, should relocation not be feasible. Approximately one-quarter mile of Trail 103 would be obliterated by road construction. This trail could be relocated to avoid crossings.

Alternative 6B would cross the Two Medicine-Elk Calf Mountain NRT 133 in one location, and Trail 137 at two locations. Between Badger Cabin and the drill site the road would affect Trails 103 and 144 as described for alternatives 1A and 1B. Crossings of Trails 133 and 137 would have to be made safe for users of the trails.

Alternative 7A would cross the Two Medicine-Elk Calf Mountain NRT 133 in one location. Trail 170 would be crossed at one location, Trail 101 at two locations, and the Whiterock Trails 102 and 102A would be crossed in one location. Between Badger Cabin and the drill site the road would affect trails 103 and 144, as described for alternatives 1A and 1B. One crossing of Trail 133 can not be avoided. Trail 101 could be relocated away from the new road to avoid any crossings. Where crossings of Trails 102, 102A, and 170 occur, provisions would have to be made to construct safe crossings for users of the trails, should relocation not be feasible.

Alternative 7B would affect the Two Medicine-Elk calf Mountain NRT 133 as described for alternative 1B. Effects on Trails 101, 102, 102A, 103, 144, and 170 would be as described for alternative 7A. Mitigation for NRT 133 would be as described for alternative 1B. Mitigation for Trails 101, 102, 102A, 103, 144, and 170 would be as described for alternative 7A.

Alternative 8 would cross the Two Medicine-Elk Calf Mountain NRT 133, should alternative 1A and a portion of alternative 1B be used for access. The staging area could be relocated adjacent to the Pike Creek road to avoid crossing the NRT 133. Helicopter flights over trails in the Two Medicine River drainage could be seen and heard by users of the various trails. The effects of trail users being able to see and hear the helicopter could not be avoided.

Access to *alternative 9* would have no noticeable effect on trails. Helicopter flights could be seen and heard by users of trails in the vicinity of Whiterock Pass and Badger Cabin. Shifting the flight path further east of Whiterock Pass and Badger Cabin could reduce the potential for seeing and hearing the helicopter on flights to the drill site.

Alternatives 1A, 6A, and 7A would replace the Snowmobile Loop Trail 134, from Summit campground to the Two Medicine River crossing.

Alternatives 1B, 6B, and 7B would replace Summit Cutoff Trail 133Y, from US Highway 2 to the South Fork of Two Medicine River crossing.

Alternative 12 would not result in any activities, therefore there would be no change in the trail system, or trail use.

The Lewis and Clark National Forest Plan provides for regulation of public use during mineral exploration activity. Road and trail use regulation is discussed in detail in Chapter V. Effects on recreation users is discussed in more detail in Section IV.1.J.

e. Reclamation

Reclamation requirements under all action alternatives would be based on standards and guidelines contained in the Lewis and Clark National Forest Plan. The Forest-wide standards provided in the Forest Plan under Minerals (see Appendix C), state that the reclamation guidelines outlined in Hadley (1983) will be followed for oil and gas access roads. Those roads designated for future administrative use or identified in the Forest Plan as important arterial/collector access routes for the area could remain, but would be left in a condition suitable for non-use maintenance. As defined in Hadley (1983), the restoration options would be applicable following drilling activity.

1) *Reclamation activities* would consist of removing all drainage structures in the roadway and restoring the road prism back to original contour. All compacted road surfaces would require plowing or scarification to 8 to 12 inches. All materials excavated in road construction would be replaced back into the road prism in maximum 2 foot lifts and compacted.

2) *Obliteration activities* would consist of the removal of any drainage structures, bridge abutments and road fills from the floodplains, ripping, plowing, or scarification of the roadbed, and construction of water bars and barricade beams to prevent vehicle access.

3) *Non-use maintenance activities* would consist of removing drainage structures where erosion or sedimentation potentials would not meet Federal and State water-quality standards. Installation of water bars, annual inspections to maintain drainage facilities and runoff patterns, and construction of barricade beams with appropriate signing to prevent vehicle access would be required.

All reclaimed surfaces, where drainage structures had been removed etc., would be reseeded and fertilized as appropriate.

The ID Team developed several additional reclamation and road management options based on the Lewis and Clark Forest Plan. The ID Team then developed a strategy of reclamation for each alternative based on existing use, and possible planned use. This analysis is displayed in Appendix K.

Alternative 12 (no action) would cause no change, so there would be no effects.

Reasonably Foreseeable Actions

A Dry Hole

Drilling a second well, should the exploratory hole prove dry, would have no additional effects on the forest transportation system other than extend use of the area and roads for a longer period of time. Effects on local trails would depend on the location of the second well and the permitted operating season.

A One Well Production

For *alternatives 1A, 1B, 6A, 6B, 7A, or 7B*, volume of oil and gas related traffic entering and exiting US Highway 2 would decrease from that needed for the exploratory drilling operation. Should production from the well be trucked from the area instead of piped, truck traffic would continue entering and leaving US Highway 2. Any hazard warning procedures used during drilling, to alert users of US Highway 2, would also be a benefit during the period the well was in production.

For *alternative 2,* traffic volumes should be less than for the exploration proposal. Should production from the well be trucked rather than piped, truck traffic would continue throughout the life of the well. However, no cumulative effects on roads and trails are anticipated. For *alternatives 8 and 9*, it would be necessary to construct an access road to the well site along one of the roaded alternative alignments. Road construction and use would be similar to that described for the roaded alternatives. Effects on trails also would be similar.

Traffic volumes during the production period should be less than for the exploration proposal (15 to 30 vehicles per month for monitoring the well site) rather than 5 to 37 vehicles per day as anticipated during the drilling of the proposed well. A slight increase would be evident during the period of pipeline installation if a pipeline is needed. Should the well production be transported by tanker truck rather than by pipeline, low volume truck traffic would continue throughout the life of the well.

Use of roads by the public is not anticipated during the period of operation except where specifically authorized. This is discussed in detail in section IV.3.

Most of the effects to the trail system would have occurred in association with the proposed drilling activity. Production from the well would prolong the duration of activity and use of access roads to the well site. This would create a long term period where those affected trails would not be available for public users. This adverse situation could be mitigated by having the oil and gas operators construct substitute trails around oil and gas facilities

It is likely that reclamation practices required for the exploration proposal would also be implemented for field production activities once production from the well was finished.

A Field Production

Some additional road access would be required for additional drilling and servicing of the wells. All new roads would be accomplished following appropriate environmental review and mitigation to protect National Forest resources. Level of field activity in the target area would be greatest during the first several years of field development when drilling and construction activities are most prevalent. This would be expected to taper off after 5 or 6 years as construction activities are completed and the well and pipeline maintenance activities normalize. Effects anticipated for this level of field development would be similar to that discussed for the one well production, as the main road system would already be in place. Cumulative effects of oil and gas production in the RM-1 unit is discussed further in section IV.3.

E. GLACIER NATIONAL PARK AND ADJACENT WILDERNESS

This section discusses the environmental effects on Glacier National Park and adjacent wildernesses that could result from implementation of the various alternatives. Concerns have been expressed about the proximity of the proposed activity to wilderness and national park areas.

The discussion describes how implementation of the various alternatives could affect air quality, noise, natural vegetation, visual change, wildlife and related ecological values.

Chevron's proposed wellsite is located approximately 14 miles southeast of the southern boundary of Glacier National Park, approximately four miles to the northeast of the Great Bear Wilderness and seven miles to the north of the Bob Marshall Wilderness at their closest points (Map 1.2).

Exploration Proposal

a. Air Quality

Potential air quality effects anticipated during road construction and exploration drilling are discussed in detail in Section IV.1.C. As described in IV.1.C., the most likely sources of air quality degradation would be during well drilling, from exhaust (emissions) from vehicle engines, and/or fugitive dust from roads, staging areas, and the drill site during construction and operations.

A well blowout, although not likely, could release gases (including hydrogen sulfide), dissolved salts, and dust into the ambient air in substantial quantities. Once airborne, these materials could either disperse into the atmosphere or concentrate near the source area depending on the prevailing local climatic and meteorologic conditions. Under the locally windy conditions that are characteristic of this area of the Continental Divide, it is expected that gaseous materials would disperse into the atmosphere and migrate downwind in an easterly direction-away from the National Park and Wildernesses. Under quiet air conditions, the heavier airborne contaminants would tend to disperse and migrate to the lower elevations-possibly in the lower drainages of Badger Creek where they would eventually be dissipated by wind action.

Blowout contaminants are unlikely to concentrate in low areas in Glacier Park and the Wildernesses because these areas are more exposed to upper level prevailing winds and are above inversion levels. Under these conditions, the proposed project and the access related alternatives are not expected to affect the Class I air quality of Glacier National Park and the wildernesses, and should not exceed State and Federal ambient air quality standards for these areas. The proposed project is not expected to degrade the visibility of these Class I areas.

During dry months, some dust and vehicle emissions would result from implementation of any alternative that requires road construction and/or use.

Under *alternatives 1B, 6B, and 7B*, road construction would begin at US Highway 2, which lies adjacent to the southern boundary of Glacier National Park (Maps 2.1, 2.2, and 2.3). *Alternatives 1A, 6A, and 7A* would entail minor reconstruction of the lower one mile of the Pike Creek Road No. 8958 and new construction from the Pike Creek Road to the wellsite. This activity would take place in the vicinity of Summit Campground and Marias Pass and dust and emissions may be noticeable to visitors. *Alternative 8* would require a temporary road and staging area within one mile of the Park boundary for helicopter mobilization and support of the drilling operation (Map 2.4). Road dust and vehicle exhaust from use of these roads could accrue along these routes during periods of heavy vehicle use-i.e., during road construction and the actual drilling period. Such particulate matter could migrate to the Park boundary under certain climatic conditions (conditions that would cause the dust and emissions to drift northward). However, such amounts may not be detectable to the Park visitors. Airborne contamination would disappear once the drilling operation ceased, or as dusty conditions ceased. Mitigation measures such as watering roads and limiting traffic on roads (Refer to Section V-Mitigation and Monitoring) would lessen the potential for road dust problems. Vehicle emissions would be present during the construction and drilling period, but should be considerably less than emissions along US Highway 2.

Alternatives 2, and 9 would result in very little or no effect on these special areas.

b. Vegetation

Airborne contaminants from the drilling operation are unlikely to encroach on the Wildernesses or the lands encompassing Glacier National Park and result in measurable adverse effects on the vegetation in these areas. There is no reason to believe that natural plant communities and related ecological values of these areas will be adversely affected.

c. Wildlife

The effects on wildlife (including grizzly bear) with respect to Glacier National Park are discussed in Section IV.1.G. The discussion suggests that *alternatives 1A, 1B, 6A, 6B, 7A, 7B, and 8*, which start at US Highway 2, would have the potential to disrupt the wildlife migration through the northwest corner of the RM-1 unit. This area is the Summit migration corridor. Animals currently migrate in that area across US Highway 2 and the Burlington Northern Railroad track. *Alternatives 1B, 6B, and 7B* would have less of an impact because they are further from the Summit area. *Alternative 8* could have the greatest impact during migration periods due to the noise and concentrated activity associated with helicopters.

Alternative 2 would not affect the Summit migration corridor, but would cross a wildlife travel corridor at Whiterock pass.

Helicopter access *alternative 9*, would not effect present migration patterns.

The documented migration corridor east of False Summit would not be affected by any of the alternatives.

d. Visual

Visual effects for the RM-1 Unit are discussed in section IV.1.K. There should be very little visual effect of oil and gas activity for viewers in either Glacier National Park or the Bob Marshall and Great Bear Wildernesses. There are views up the South Fork Two Medicine River drainage from segments of the Autumn Creek Trail in Glacier Park, however, vegetative and topographic screening generally prevents views into the study area. There may be some viewing areas from high elevation open ridges, rocky knobs, and favorably located unvegetated areas within the Park that would offer views into the study area. Roads constructed under *alternatives 1A, 1B, 6A, 6B, 7A, 7B, and 8* may be visible from areas likely to be visited by only the more ardent hikers. Most visual effects would be subordinate to US Highway 2 and the Burlington Northern Railway. The Visual Quality Objectives for *alternatives 1B, 6B, 7B, and 8* for the first 1/4 mile from US Highway 2 would not be met.

Following drilling activity and no gas or oil was encountered, all project roads would be reclaimed as prescribed in the Lewis and Clark National Forest Plan (Forest Service, 1986a, Management Standard F-3). Reclamation options are discussed in Appendix K. Under all alternatives, the landscape would be returned to a natural-like condition. Revegetation would immediately follow, however, it would take many years--perhaps decades, for some of the revegetated areas to blend in with the undisturbed vegetation.

Views from the Bob Marshall and Great Bear Wildernesses into the project area would be unlikely due to terrain and vegetation blockages.

e. Water

The proposal and the alternatives would not directly affect water quality or water related values of Glacier National Park and Wildernesses because the hydrologic boundaries of the RM-1 Unit are independent of the these areas. The geologic structure in the overthrust belt is sufficiently segmented to prevent contamination of any aquifers. Drainages in the study area flow away from the boundaries of Glacier National Park and the wilderness areas.

f. *Noise*

The proposed Chevron drill site is located 14 miles from the Glacier Park boundary. The noise of the drilling rig should be inaudible to Park users. Some noise, from construction and use of access roads for the project or from helicopter operations near the Park, may carry over into the Park. Road construction noise in the lower segments of the South Fork Two Medicine River drainage would be of most concern for Park visitors. Noise generating activities would begin in midsummer and extend through the peak tourist season.

Alternatives 1B, 6B, and 7B would provide the greatest amount of short-term noise, as construction would start at US Highway 2.

Alternatives 1A, 6A, and 7A would provide some noise during bridge and road construction. A portion of this route closest to Summit Campground and US Highway 2 on the Pike Creek Road (Map. 4.1) would be undergoing reconstruction. This activity would contribute the greatest amount of noise that would be heard by Park users. The remaining road construction should be background noise and would not occur within one mile of the Park boundary.

Construction and use of roads specified under *alternatives 1A, 1B, 6A, 6B, 7A, 7B, and 8* would add to the common sounds that already occur along the Park boundary. Such sounds originate from highway traffic, trains, and heavy equipment operating on public and private lands between the Park boundary and the study area. Noise effects from all the roaded alternatives, during construction, would most likely occur during the daytime. This would be in contrast to the present noise created by highway traffic on US Highway 2 and the railroad traffic, which occurs intermittently throughout the 24 hour day.

Alternative 8 would generate the most noise (during construction of a helicopter staging area and service road) that could be heard by Glacier Park users. The most significant effect on Park users would occur while helicopters transported drilling rig components and equipment to and from the drill site at the beginning and completion of the operation. Smaller helicopters would be used on a continuous basis during the drilling period to ferry workers and supplies to and from the drilling area.

Of all the noise sources that would be created by oil and gas activity, the helicopter noise would be of most concern to Park and Wilderness users. Helicopter generated sounds would be most obvious because they would be distinctly different in character from the other sounds that were common within and along the Park's southern boundary. Helicopter sounds are generated well above the ground level (except for landing and taking off). This allows the sounds to carry for several miles. According to Rodriguez and Luchetta (1981), sound levels for large cargo hauling aircraft range from 90 to over 101 decibels (dBA) at the site of operation. This compares with a piston airplane which has noise levels of 120 dBA, and heavy traffic which approximates 80 dBA near the source. Ambient sound levels within the interior of Glacier Park range from 15 to about 40 dBA depending on location (Environmental Protection Agency, 1985).

Some measurements suggest that helicopter sound may travel for five miles before becoming inaudible (Environmental Protection Agency, 1985). The distance that such sounds would carry varies, based on a number of factors, including meteorological factors, terrain features, and the type of sound source. Public use areas in Glacier Park that would be most affected by such noise would be the Autumn Creek Trail, Coonsa Trail, and the trail north from Marias Pass. Firebrand Pass and Elk Mountain are about five miles from the proposed helicopter staging area and should be unaffected, except where background helicopter noise may carry to these sites under certain meteorologic conditions.

Alternatives 2 or 9 (Whiterock Pass) should not pose any undesirable noise effects on the Park.

The noise effects on the Bob Marshall and Great Bear Wildernesses would be similar to that of Glacier National Park with two exceptions: 1) no activity would occur within 3 to 4 miles of the Wilderness boundaries making any noise effects of a background intensity, and 2) sounds would likely only be heard from high elevations along the Continental Divide immediately south and southwest of the drill site. With the exception of helicopter sounds, noise would be screened by the presence of dense vegetation around the drill site, and the drill site's location on the east side of Goat Mountain.

h. *Alternative 12* (no action) would cause no change, so there would be no effects.

Reasonably Foreseeable Action

A Dry Hole

Exploration of another well, should the first hole prove dry, would not create any additional effects but would extend activity for an additional season or two. No cumulative effects on the Park or Wildernesses are anticipated.

A One Well Production

The air quality effects of production from one well are discussed in Section IV.1.C. It is unlikely that these effects would extend into the adjacent Park or Wildernesses. Should a pipeline be needed, some additional dust and vehicle emission would occur, with effects similar to those discussed for the exploration proposal. These effects would occur seasonally and would not result in any cumulative change on Park or Wilderness values.

Should a pipeline be required in conjunction with the roaded alternatives, there will be noise resulting from vehicle and equipment used during construction of the pipeline. The construction noise would be similar to that discussed for the exploration proposal, but would occur in different years, extending the period of activity.

Implementation of *Alternative 8* would cause the greatest cumulative effect on Park users. In addition to noise from helicopter use during the exploratory drilling operation, there would also be sounds associated with construction of a production access road, and construction of pipelines and service facilities, should an alternative, except *alternative 2*, be used.

Other sources of noise related to oil and gas production could include use of oil field access roads, gas driven jack pumps (oil production only), and compressor stations. Noise levels from some of these sources could be kept to background levels with proper mitigation and development planning. For example, a typical compressor station may emit noise levels up to 32 DBA at one mile (Kruger, 1987). Although this level approximates background noise levels for some areas of the the Park, this figure could be further reduced by locating such facilities farther from the Park boundary or using effective muffling systems.

Should production occur, it is unlikely that noises from production activities would extend to the wilderness boundaries for the reasons discussed above.

A Field Production

A long term field would have little effect upon the air quality of either the Park or Wilderness areas. Some additional dust and equipment emissions would occur during the drilling of more wells, with the associated access roads and possible feeder pipelines. Dust abatement measures would be used to control dust during the dry months. The effect of vehicle emissions should be similar to those discussed for the exploration proposal.

Portions of the field development could be visible from high ridgelines of both the Park and Wilderness areas. The viewpoints affording views into the study area should be few, however, location of wells would determine whether any development could be seen. The visual effect, if any, should be small, but would extend over a long time period until the field was abandoned and reclaimed.

There would be sounds associated with construction of a production access road, and construction of pipelines and service facilities, should the drilling have been accomplished with *alternative 8*. The effects would be similar to those discussed for the exploration proposal.

The noise associated with drilling operations and road construction would continue to be generated, until all wells in the field had been drilled. Drilling activity could extend over a period of 5 or more years. A significant portion of roads constructed under the exploration proposal or one well production would be utilized for access and pipeline for additional wells to keep construction to a minimum. The effects of construction noise would be similar to those discussed for the exploration proposal but would occur until all wells, pipelines and access roads were completed.

Other sources of noise related to oil and gas production could include use of oil field access roads, gas driven jack pumps (oil production only), and compressor stations. Noise levels from some of these sources could be kept to background levels with proper mitigation and development planning. For example, a typical compressor station may emit noise levels up to 32 DBA at one mile (Kruger, 1987). Although this level approximates background noise levels for some areas of the the Park, this figure could be further reduced by locating such facilities farther from the Park boundary or using effective muffling systems. It is unlikely that noises from production activities would extend to the wilderness boundaries.

F. BADGER-TWO MEDICINE ROADLESS AREA

During the scoping period several comments were received concerning the need to preserve the wilderness/ roadless values of the Badger-Two Medicine Roadless Area. The comments expressed general concern for one issue: How would the proposed project affect the wilderness characteristics of roadless lands in the RM-1 geographic unit? This section describes how each alternative affects that portion of the RARE II inventoried roadless area 1-485 (Badger-Two Medicine Roadless Area) as depicted on Map 3.6. This section also discusses the site-specific and cumulative effects on roadless/wilderness characteristics of implementing the alternatives described in Chapter II.

The Lewis and Clark National Forest Plan anticipated that the Badger-Two Medicine Roadless Area would be entered with activities, including oil and gas exploration. These actions are included in the Forest Plan goals and objectives and the Record of Decision. The Forest Plan decisions on roadless areas are not irreversible or irretrievable because management prescriptions that "allow" future development do not mandate that development will occur. During project analysis phase of the NEPA process, a reasonable range of alternatives must be considered, including a "No Action" alternative that would maintain the existing roadless character and wilderness features of the area.

The scope of this analysis is the Badger-Two Medicine Roadless area subunit (102,100 acres) of the Bear-Marshall-Scapegoat-Swan Roadless area. Effects that alternatives have on roadless/wilderness values are examined in terms of the following features: 1) natural integrity and appearance, 2) challenge, 3) solitude, 4) primitive recreation, and 5) other unique features. The discussion of effects includes both direct and indirect effects, as well as effects of reasonably foreseeable actions during exploration and subsequent activities.

Exploration Proposal

a. Natural Integrity and Appearance

During the drilling operation the natural integrity and appearance of the roadless area may be affected by changes in air quality, vegetation, access and trail routes. Dust would be created during construction or reconstruction for any of the roaded alternatives. Following construction, dust quantities would be considerably lower. The amount of acreage directly or indirectly disturbed by the operation would be 640 acres for either of the helicopter alternatives and from 7,680 acres to 8,512 acres for roaded alternatives. These acreages represent from 0.6% to 8.3% of the total roadless acres. Table 4.3 lists the changes in the roadless acreage if these various alternatives were implemented.

Introducing motorized access into an area that currently receives little vehicle use would be a direct affect of any of the roaded alternatives. A developed roadway would exist where primitive or no roads existed previously. Trails that would conflict with a roaded corridor may result in some road vs. trail user conflicts. *Alternatives 8 and 9*, would result in a minimum of disturbance because no roads would be constructed in the roadless unit. The greatest effect of helicopters would be noise created in overflights. Helicopter alternatives would not affect natural integrity and appearance of the roadless area except on approximately 7 acres comprising the well site. Under *Alternative 12*, the natural integrity and appearance that currently exists would remain.

b. Challenge

The opportunity for challenge and risk associated with recreation in a roadless setting may be diminished by project activities associated with all action alternatives. This effect would be greatest near the areas of proposed drilling activity. This effect would cease once the drilling is done and reclamation is completed. Under *Alternative 12*, the opportunity for challenge and risk that currently exists would remain.

c. Solitude

The sights and sounds associated with project activity will reduce the amount of the Badger-Two Medicine roadless area available for experiencing solitude and isolation. Construction equipment and use of roads specified under the roaded *alternatives 1A, 1B, 6A, 6B, 7A, 7B* would add to the common sounds that already occur along US Highway 2 and the Burlington Northern Railway. Noise effects from all roaded alternatives would occur mostly during the day which is in contrast to the present noise patterns of 24 hour day use along US Highway 2. For all roaded alternatives including Alternative 2, it would create significant noise effects along the activity corridor leading to the drillsite. A sense of intrusion may be felt by recreationists entering areas disturbed or affected by the proposal.

Helicopter noise associated with *alternatives 8 and 9* would be the most disruptive to the potential solitude of the Badger-Two Medicine area. Helicopter noise has the potential to carry up to 5 miles (EPA, 1985). A noise effect of this extent has the potential to affect the entire roadless area during periods of helicopter operation. Noises associated with the drill rig and activity at the well site would also be significant in the vicinity of the well site. At approximately 0.5 mile radius from the drilling area, noises would be decreased to about the whisper level (25 decibels) (Kruger, 1988). Under *Alternative 12*, the solitude and isolation that currently exists would remain the same.

d. Primitive Recreation

Primitive recreation opportunities currently include a mix of motorized and non-motorized dispersed recreation in roaded-natural and semi-primitive settings. This mix of recreation opportunities would change primarily along road corridors proposed for *alternatives 1A, 1B, 2, 6A, 6B, 7A, 7B*. This effect would be due to road and trail closures and the sights and sounds associated with project vehicles. Hunters would be affected by changes in game areas. The potential for more primitive recreation experiences would be diminished in the northwestern portion of the roadless area. Under *Alternative 12*, the current opportunities for primitive recreation experiences will remain the same.

e. Other Unique Features

Other unique features of the area include the existence or potential habitat for four threatened or endangered species and a pure strain of westslope cutthroat trout. There would be no adverse effects to the populations of these species from implementation of any of the action alternatives considered (refer to Section IV.1.G and IV.1.H. for more information). Under *alternative 12*, the existing situation would remain unchanged.

f. Reclamation

Reclamation, as proposed in Appendix K, would not fully mitigate all adverse effects on the roadless character. Long-term visual effects related to road reclamation for *alternatives 1A, 1B, 6A, 6B, 7A, 7B* and well site reclamation for all action alternatives would be evident for several decades while vegetation conforms to the adjacent vegetation in undisturbed areas. The road reconstructed under *Alternative 2* would remain for Forest Service administrative use in accordance with the Lewis and Clark National Forest Travel Plan (1988). This road would result in a long-term change in the existing roadless character because the road is currently unimproved from Whiterock Pass to the Badger Cabin. Restored trails may be located within areas of reclaimed road right-of-way. Encounters with the upgraded administrative road or reclaimed road surface may lessen the primitive experiences of users. All roaded alternatives would result in a reduction of 2,176 acres of Semi-Primitive designated area to Roaded Natural designated area. No reduction of Semi-Primitive acres would occur under the helicopter alternatives.

Irrespective of the alternative selected, a large proportion of the Badger-Two Medicine roadless area would remain roadless and retain the associated natural characteristics. Some would argue that access of any kind is an intrusion and would affect the entire area. While effects particularly during the drilling operation would extend over 3 or 4 seasons, it would not be apparent to most visitors following final reclamation of the project.

Reasonably Foreseeable Actions

A Dry Hole

The effects caused by drilling a second well would be similar to those discussed for the exploratory proposal, with a longer duration of time involved. Additional acreage of vegetative disturbance would be slight.

A One Well Production

Effects to the roadless area would remain similar to those discussed for the exploration proposal. The difference would be in the length of time that a road and/or well site would be used. *Alternative 8 and 9* would require new roads to access production facilities. At the end of production, the road and well site would be reclaimed as described in Appendix K. The potential effects to the degree of challenge and risk sought by users in the roadless area would also continue through the life of the well. Although the impacts of production activities are significantly less than during exploratory drilling, the degree of solitude and isolation sought by some roadless area users would continue to be compromised through the life of the well. The potential for diminishing the primitive recreation experience would continue throughout the life of the well. There are no adverse effects expected on wildlife and fish populations except as noted in Sections IV.1.G and IV.1.H.

A Field Production

A significant level of activity would occur for a period of years (5-10) following drilling of the first well. Upon completion of the exploratory drilling phase and field development, the level of activity, including noise and vehicle traffic, would decrease substantially. The roaded corridor into the roadless area would remain through the life of the field. The amount of disturbed acres would increase with every new production well until a class D size field is achieved (see Table 4.3). Some additional trails may have to be displaced or closed. Road use restriction near the project site would remain throughout the life of the field. An increased production area would decrease the amount of area available to experience challenge, risk, solitude, isolation and primitive recreation. Effects of field development on wildlife and fisheries are discussed in Sections IV.1.G and IV.1.H.

The creation of the *one well production* and/or the the *field production* would substantially alter the natural characteristics that are desirable in designated wilderness. The outcome of either of these scenarios could preclude wilderness designation for portions of the present roadless area into the foreseeable future. This would be an irretrievable loss of some wilderness value, but this would not necessarily preclude wilderness designation at some future date.

Table 4.3
Surface Change In The RM-1 Portion Of The RARE II (1-485) Roadless Area

Alternative Number	Surface Acres Disturbed	Effective Area Disturbed*		Acres Remaining Undisturbed	Class D Field Total Effective Acres Disturbed
Alt 1A	61 Acres	8,512 Acres	8.3%	93,588 Acres	10,432 Acres
Alt 1B	60 Acres	8,320 Acres	8.1%	93,780 Acres	10,240 Acres
Alt 2	56 Acres	7,680 Acres	7.5%	74,420 Acres	9,600 Acres
Alt 6A	58 Acres	8,000 Acres	7.8%	94,100 Acres	9,920 Acres
Alt 6B	56 Acres	7,680 Acres	7.5%	94,420 Acres	9,600 Acres
Alt 7A	61 Acres	8,512 Acres	8.3%	93,588 Acres	10,432 Acres
Alt 7B	60 Acres	8,320 Acres	8.1%	93,780 Acres	10,240 Acres
Alt 8	5 Acres	640 Acres	.6%	101,460 Acres	**
Alt 9	5 Acres	640 Acres	.6%	101,460 Acres	**
Alt 12	0 Acres	0 Acres	0%	102,100 Acres	0 Acres

*One-half mile either side of road and well.

**The acreage would depend upon location of production access road.

G. WILDLIFE

Two major concerns expressed by the public were the effects of the proposed project on: 1)Threatened and endangered species (grizzly bear, wolf, bald eagle and peregrine falcon), and 2)Wildlife species in general (elk, moose, bighorn sheep, goat, deer, black bear, furbearers, and nongame species).

The actual land disturbance that would result from the proposed project would be less than 100 acres. The analysis of impacts to wildlife focused on habitat disturbance and displacement of wildlife, rather than habitat conversion.

The effects of implementing the various exploration alternatives for the proposed Chevron project are discussed below in the context of their effect on individual wildlife species. The potential effects on all species considered (except mountain goat) use the boundaries of the Badger Two Medicine Bear Management Unit. The potential effects on the mountain goat are discussed in terms of the Goat Mountain-Running Owl-Bullshoe Mountain area (Map 3.9). Effects on the west side of the Continental Divide are not discussed because the Divide acts as a natural barrier for travel for some species. In addition, it is believed that some potential effects from the project activity would appear to be insignificant when compared to a much larger study area. There is some discussion of potential impacts on the west side of the Continental Divide in Section IV.3-Cumulative Effects. Figures 4.3-4.8 which show acres and percentages of seasonal ranges affected are for a *yearlong* operating window. The effects of mitigation measures are not included in the figures. The effects of mitigation are discussed in the text for individual species.

1. Threatened and Endangered Species

Detailed information on threatened and endangered species is discussed in the biological evaluation in Appendix F. The following discussion is a summary of the biological evaluation. Two scenarios will be discussed: 1) exploration proposal/dry hole, in which the well is drilled and then reclaimed because of no presence of hydrocarbons, and 2) production scenario of a one to three well field.

Exploration Proposal

a. Grizzly Bear

Effects on grizzly bears may be direct, indirect, cumulative, short term or long term. The direct impacts to grizzly bear habitat, in terms of converting the existing vegetation to some other type will be minimal and will not be the focus of discussion. The major impacts to grizzly bear habitat would be short term and of a direct nature due to displacement from preferred areas, the potential for increased mortality and the potential for introduced attractants and bear/human conflicts. The potential exists for long term effects if the well is a producer.

The Rocky Mountain Front Cumulative Effects Model (Forest Service et. al., 1987), seasonal mapped ranges, and the research data gathered by Keith Aune, Montana Department of Fish, Wildlife and Parks, were the main tools used to evaluate the impacts of the proposed well on grizzly bear habitat (Appendix F). The cumulative effects model creates two outputs to measure the effect on grizzly bear habitat: 1) habitat effectiveness and 2) mortality risk index. These are described in Chapter I.D. Selection of the no action alternative would have no effects over the current effects from mans' activities on grizzly bear habitat. The following discussions will pertain to the action alternatives, except for where specifically noted.

Seasonal mapped ranges for the grizzly bear include spring range and denning range (Map 3.7).The disturbed acres of spring range resulting from any of the Chevron action alternatives would be very similar. However, *alternatives 2 and 6A* disturb the least acres of spring range for the roaded alternatives. The helicopter staging area for *Alternative 9* disturbs the most acres of the helicopter alternatives; however, the location at Palookaville would be disturbing spring range of lesser quality (Figure 4.5). This has been demonstrated by actual telemetry use data collected by Aune(1987) and by the seasonal habitat values that were generated by the cumulative effects model.

Grizzly bear denning habitat would be directly affected by all Chevron alternatives. The least amount of denning habitat that would be disturbed is for *alternatives 1A,1B,6A,6B,7A, and 7B* and the greatest amount of the denning habitat that would be disturbed is for *alternative 9* (Figure 4.5).

The cumulative effects model utilizes habitat quality and the zone of influence of an activity to determine its habitat effectiveness output. Placing human activities within higher quality habitat has more effect on the habitat than if the activity is in lower quality habitat. However, the larger the zone of influence, the more acres of habitat that is disturbed. Therefore, a lower quality habitat with a large zone of influence may reduce habitat effectiveness more than a high quality habitat with a lesser zone of influence.

A comparison of the cumulative effects model outputs reveals that there are measurable differences between alternatives on effects to grizzly bear habitat (Figures 4.1 and 4.2). In comparing the yearlong habitat effectiveness of the existing situation to the alternatives (unmitigated) the *helicopter alternatives* decrease the habitat effectiveness and the mortality risk index the least. Of the roaded alternatives, *alternative 2* decreases the habitat effectiveness and the mortality risk index the least. The habitat effectiveness and the mortality risk index in the South Fork Two Medicine River corridor is very similar for *alternatives 6A ,6B ,7A , and 7B*.

In examining the model outputs, *alternative 2* has the largest zone of influence (ZI) but the quality of the habitat as demonstrated by the seasonal habitat values (SHV) is the lowest (Appendix F). Because the quality of the habitat is lower, *alternative 2* results in the lowest reduction of habitat effectiveness of the roaded alternatives. The habitat quality for *alternatives 6B and 7B* is the highest of the alternatives. Because the habitat quality is higher, these alternatives reduce habitat effectiveness more than *alternative 2*, even though their zone of influence is smaller.

Selection of any action alternative would result in a "may effect" situation for the bear. This is based on the temporary reduction in habitat effectiveness and the potential to displace the bear from the zone-of-influence of the road and well site during the operation, or the potential to make the bear modify it's home range due to the project.

b. Gray Wolf

Selection of the no action alternatives would result in no effects to potential wolf habitat.

Selection of any of the action alternatives will not impact any habitat components such as den sites or rendezvous sites since none are known to exist. Thus, effects on wolves are limited to the potential for indirect effects in the form of mortality to the wolves prey species due to the potential increase in access. The wolf prey species that exists in the BMU are elk, moose, deer, small game and beaver.

Implementation of any of the Chevron alternatives would have minimal direct impacts to the wolf. *Alternatives 6B and 7B* would have the potential to cause a direct effect to their moose prey base because these routes pass through moose winter range along the South Fork Two Medicine River. These routes would cause some displacement and increase the potential for loss of moose due to vehicle/animal collision, and illegal kills. These effects would probably be minor and short term. The illegal killing of moose can be mitigated by access restriction and requirement of no firearms in company vehicles. Some of the effects could also be reduced by timing restrictions, however, the windows that have been identified for operation would allow access through the moose winter range in the winter months. The 3 to 5 month operating window for Chevron would require at least 4 to 5 seasons to complete the entire project. This does not facilitate completing the project in the shortest time possible, while providing protection to some key seasonal ranges. However, because of the low population of moose in the area, the relatively short duration of the project, and the lack of a wolf pack in the area, the potential to directly effect the wolf is very minimal.

Implementation of *alternatives 2 or 9* would result in little if any impacts to the prey base and therefore would result in minimal impacts to the wolf.

Selection of any of the alternatives will have a "no effect" situation on the wolf. This is based on short term impacts for the exploration well and the absence of a wolf pack in the area.

c. Bald Eagle and Peregrine Falcon

All alternatives for the Chevron and Fina projects would have very little direct or indirect effect on existing or potential habitat for either species. The only potential effect could be the encroachment on riparian habitat at the crossing of the South Fork of the Two Medicine River by either project in the vicinity of Sawmill Flats. However, there are no known eagle nest sites or communal roost sites along this portion of the river. No known falcon eyries, historic or present, would be affected by any of the alternatives that are being considered.

Reasonably Foreseeable Actions

A Dry Hole

Refer to discussion under "Proposed Action" above.

One Well Production

a. Grizzly Bear

Selection of a production corridor over Whiterock Pass would result in about 5,600 acres or 12.4% of the grizzly bear spring range being within the zone of influence of the road corridor (Figures 4.5 and 4.6) and would result in an average habitat effectiveness of 76.23% (See Appendix F). It is anticipated that one lift station along the road about one third of the distance up the slope from Badger Cabin would be needed to pump the gas and condensate to a production facility in the vicinity of Palookaville. The lift station would be a building about 20' x 30' and could have a gas powered pump or an electric pump in it. It is anticipated that visitation to the station and well site would be daily during the initial phase of production and would either be done via the Whiterock road or by trail up the South Fork Two Medicine River.

Selection of a production corridor that follows the South Fork Two Medicine River would affect between 6,000 to 7,700 acres or 12.4% to 17.1% of grizzly bear spring range within the zone of influence of the road corridor (Figures 4.5 and 4.6) and would result in an average habitat effectiveness of 75.37% (See Appendix F). The acres that are within this corridor are of high value to the bear as demonstrated by the use data gathered by Aune (1987). Production of the well by this route would require a pipeline buried in the road corridor and it would flow by gravity pressure either to a production facility at Sawmill Flats or at False Summit. If the production facilities were at Sawmill Flats, there would be a need to maintain the access road and the bridge for production and administrative vehicle traffic. This in turn would allow for more disturbance within grizzly bear spring range than is taking place at the present time. If the production facilities were cited at False Summit, a pipeline would proceed down the South Fork and tie into the production facilities. These production facilities would be at the very periphery of the spring range and would reduce the impact to grizzly bear habitat.

As with the exploration alternatives, a production route over Whiterock Pass would reduce the habitat effectiveness less than following the South Fork Two Medicine River north to US Highway 2. The habitat quality as demonstrated by the cumulative effects model shows that the Two Medicine River production corridor is higher than the Whiterock Pass Corridor.

b. Wolf

The basic impacts that have been discussed under the exploration phase would carry forth to the production scenario. However, instead of the effects being short term, they now become long term and have the potential to affect the wolf to a greater degree depending on which access alternative is selected and where the production facilities are located.

Selection of a production corridor over Whiterock Pass (alternative 2), would result in minimal to no effects on the wolf. Even though this route passes through elk and moose winter range in the vicinity of Badger Cabin, this route affects only a minor amount of this winter range. The snow depths in this area make the winter range marginal and the winter concentration of the animals is usually further down the Badger Creek drainage. Also, telemetry data for elk shows little to no use by wintering animals along this corridor. The main elk winter range lies to the north in the Hall, Box and Hyde Creek area.

Selection of a production corridor that follows the South Fork Two Medicine River could have more effects on the moose and thus on the wolf. If the production facilities were sited at Sawmill Flats there would be a need to maintain the access road and the bridge open to vehicle traffic. This in turn would allow for more disturbance within moose winter range and in turn could affect the prey base of the wolf. If the production facilities were sited at False Summit, a pipeline would proceed down the South Fork and tie into the production facilities. No facilities would be required in the winter range and would reduce the effect on the prey base and the wolf.

A Field Production

This scenario would be similar to that of the "One Well Production" above. Additional acres of disturbance would occur with each additional well and any corresponding production facilities. The activity may also occur over a greater period of time, until the wells were abandoned and reclaimed. The high level of activity that occurs during drilling would continue for a longer period of time until all the wells have been brought into production phase. It is anticipated that daily visits to well sites would occur until a history of production was established. Remote monitoring and fewer visits may then be feasible (See Section IV.1.A-Oil and Gas Exploration and Production).

2. Big Game Species and Other Wildlife

Exploration Proposal

Effects on big game species would result primarily from road construction and use. The noise associated with the helicopter access alternatives could also be a significant factor affecting behavior of big game species. In addition, increased roaded access could result in more hunting pressure. These factors, and the concern that migration routes would be affected, are discussed below.

a. Elk

Considerable research has been done on the effects of roads in relation to elk. Studies have shown that elk will avoid habitat that is within a one-half mile zone from either side of a road that is open to traffic (Lyon et. al., 1985; Anonymous, 1978; Perry and Overly, 1986). Utilization of habitat along a road corridor is also dependent on the type of road, and the amount of use of the road. The higher standard the road is constructed (i.e., two lane or single lane with turn outs versus a 4-wheel drive road), and the heavier the road use, the larger would be the zone (along the road) not utilized by elk. Perry and Overly reported that roads along, or through meadows, and/or open forest reduced use of habitats up to 95 percent. They also found that utilization of the habitats was greater where roads were built in dense forest.

Ward and Cupal (1979) conducted a study in Wyoming and found that elk fitted with heart monitors and radio collars responded with an increased heart rate, when they detected human activity. The elk reacted most strongly to sonic booms, gunshots, people on foot, and stopped occupied vehicles. This alert reaction occurred at distances as far as 1,300 feet. However, flight from the area occurred only in instances where distances to such activities was considerably less. This study supports other study by Ward (1976), that indicated elk prefer to maintain a buffer of 2,624 feet for persons on foot, and 1,300 feet for moving traffic.

Johnson and Lockman (1980) reported that elk cows in the vicinity of an oil and gas drilling operation in Wyoming moved their calves away from access roads when drilling occurred. In a similar study, Knight (1980) found that elk avoided the drill site, until they became accustomed to the noise and activity. Once the elk adjusted, the drilling site did not affect movements or distribution.

Lyon et. al., (1985) made recommendations for road construction practices that would retain security of elk habitat, which include: 1) locating permanent and high volume traffic roads in those areas least used by elk, 2) maintaining frequent dense cover areas adjacent to the road, 3) avoiding road construction in saddles or low divides frequented by elk, 4) constructing roads to the lowest standard that would meet management objectives, 5) locating roads, even temporary roads, to avoid disturbance of moist sites and other areas of concentrated use by elk, and 6) avoiding construction in important elk winter range.

These research studies indicate that one of the greatest adverse effects on elk would be the loss of habitat due to displacement along the roads constructed and used as prescribed for the roaded alternatives.

Approximately two miles of the road proposed for construction under *alternatives 1B, 6B and 7B* pass through a corner of the Hall Creek-Two Medicine River elk calving area (Map 3.7). The loss of the calving habitat, due to the road, would be about two to four percent (approximately 360-665 acres out of 17,833 acres) of the total calving area available (Figures 4.3-4.4). The loss of this acreages would be in the northwest corner of the calving area, which lies along a ridge about one mile from US Highway 2 and the railroad. Because it would be on the fringe of the calving area and adjacent to existing activity, it would not be a significant loss of habitat for the elk.

The remaining area crossed by all the roaded alternatives would be used by the elk as summer range. Although there would be displacement along the road corridor, the resulting loss of habitat would be minor in contrast to the amount of undisturbed summer habitat available for elk. *Alternatives 6A and 6B* traverse an area west of the South Fork Two Medicine River, and would reduce habitat use on the summer range more than alternatives 1A, 1B, 7A, and 7B because the road would lie within the summer range area between the river and the Continental Divide. *Alternatives 1A, 1B, 7A or 7B* already overlap with the influence of recreational and motorized use on Trail 101 that parallels the South Fork Two Medicine River.

Road location for *alternatives 7A or 7B* could have some long term benefits, should the well prove to be a dry hole. Trail 101 could be relocated out of the riparian zone and established on the reclaimed roadway. For segments of the trail, this would allow for as much as a one-half mile buffer between the trail and the river for use by elk and other wildlife.

Alternative 2 traverses open, mountain grasslands from Palookaville to about one-half mile west of Whiterock Pass. From Whiterock Pass, the road would pass through closed stands of lodgepole pine, spruce, and fir. This alternative crosses a movement corridor that links the area south of Whiterock Pass to the area to the North. Because of the lack of cover in grassland area and the vehicle use on the existing road (which is presently open to Whiterock Pass from July 1 to December 1), the area adjacent to the road receives very little use by elk. Consequently, displacement of elk under this alternative would be minimal. This route, and all other *roaded alternatives*, pass through mapped elk winter range in the vicinity of Badger Cabin (Map 3.7). This area would be more important to elk during early winter and spring rather than the winter months of December through March, because of 3-4 foot snow depths. The actual area affected would be about 700 acres, or 3 percent of the available total winter range (25,714 acres) in the RM-1 Unit (Figures 4.3 and 4.4)

Research has also shown that increased harvest, both legal and illegal, can result from increased roading of an area (Anonymous, 1978). Because of the high illegal mortality on radio collared elk (refer to Chp.III.G-Wildlife), it is reasonable to conclude that any increase in uncontrolled access could increase illegal mortality. Elk make use of the entire RM-1 Unit. They are widely dispersed during the summer-fall months and become more concentrated during the winter-spring period in the vicinity of Hall, Box, and Hyde Creeks. In addition to the increased concentration, the animals would be more easily observed due to the open grassland comprising these areas. Elk would therefore become more vulnerable to illegal mortality in this vicinity than in other parts of the RM-1 Unit.

Alternatives 8 and 9 involve helicopter access. Little road construction would be involved with either alternative. Alternative 8 would require one mile of road construction to the staging area. The existing road into Palookaville would access the staging area for alternative 9. Bromley (1985) assembled information that relates impacts of oil and gas development on wildlife populations. Several research projects listed in her document indicate that low flying helicopters are very disturbing to wildlife. Her information shows that an area of 1.5 miles around a drill rig or landing zone is likely to be affected by helicopter operations. The literature seems to support a minimum altitude range of 500 ft. to 1,000 ft for flight paths at which minimum response by elk occurs. The Interagency Rocky Mountain Front Guidelines (1987) recommend a minimum flight altitude of 600 feet when helicopters are operating between landing zones. If the flights were above 600 feet in elevation, little or no displacement would occur along the flight corridor, however high displacement would occur at the landing zones as documented by Bromley (1985).

Many of the impacts on elk that would result from implementation of the various alternatives can be lessened by mitigation, such as: road closures during hunting season, spring migration, and other key times of the year (such as severe winters). The Interagency Rocky Mountain Front Guidelines (1987), as discussed in section G of Chapter III and portrayed in Table 3.3, describe the general timing windows for human activities that would minimize impacts on elk.

b. Moose

Effects on moose by any of the roaded alternatives would be minimal. Bromley's study (1985) supports a commonly held belief that moose are fairly tolerable of roads and activities associated with roads. The biggest threat to moose would be increased access for motorized use and illegal harvest of the animals. These effects could be lessened by implementing the Rocky Mountain Front Guidelines proposed for elk and by controlling access on newly constructed roads.

All roaded alternatives within the South Fork Two Medicine corridor are located within moose winter range to some extent. *Alternatives 1A, 1B, 6A, and 6B* would have the greatest impact on moose habitat because of the proximity of the proposed roads to riparian zones and willow bottoms. *Alternative 2*, passes through moose winter range in the lower elevations of Whiterock Creek, around Badger Cabin, and along the North Fork of Badger Creek.

Alternatives 8 and 9. Bromley (1985) indicates that moose have varied responses to helicopters, and that they tend to be more tolerant of helicopter noise than other species. As discussed previously for elk, minimum flight altitudes could further reduce this effect.

c. Mountain Goats

Oil and gas activity in the RM-1 Unit could adversely affect mountain goats in the following ways: 1) displacement of animals away from areas of human activity, 2) increase the potential for illegal taking due to ease of access, and 3) addition of a stress factor to a population that is already low.

The noise related to drilling activity has been found in some cases to result in animal displacement. Busnel (1978) found that reaction of wildlife to noise is varied depending on the species and type of noise. Transient loud noises normally provoke alarm. Many animals apparently learn to ignore noise that is not associated with negative experiences, for example being chased by humans. Geist (1978) states that animals may initially react with fright to an unusual sound, but subsequent behavior depends on the experiences associated with the sound. Animals often learn to ignore persistent, localized noise that they can approach or avoid. Joslin (1986) found that radio collared goats in the vicinity of a well drilling operation in the Blackleaf-Muddy Creek area avoided the drilling area while some uncollared goats were observed in the vicinity of the drill rig.

Stress, while difficult to quantify or qualify, applies to some extent to *all alternatives* that would allow the drilling operation to proceed. Individual goats could be stressed, causing increased hormone levels, heart rate, respiration and metabolic rates. The consequences of stress could show up as reduced feeding time, increased fetal abortion or resorption, reduced reproductions, avoidance of selected habitats, and a potential of reduced populations (Joslin, 1986). Stress can also be induced by poor quality habitat. The habitat in the vicinity has not been qualitatively assessed, but it may be assumed that the quality is not of poor stature because the goat population has been responding in a favorable upward trend from a decline during the period from 1984-86. This upward trend is reflected in the surveys taken by the Montana Department of Fish, Wildlife and Parks to monitor the population trends of the herds.

The proposed well site and approximately 3.4 miles of road southwest of the North Fork of Badger Creek would be located in occupied yearlong goat habitat (which includes kidding, breeding, and nursery areas) for *all roaded alternatives* (Map 3.9). The first 1.2 miles of road, after crossing the North Fork of Badger Creek, would lie on the border of yearlong habitat and would also be on the east edge of a goat travel corridor that links the Goat Mountain with the Running Owl-Bullshoe Mountain complex.

Approximately 9% of the goat habitat in the Goat Mountain-Running Owl-Bullshoe Mountain complex would not be available to some goats, due to displacement, during exploratory drilling (Figure 4.5). This figure was derived by using a buffer of one-half mile on either side of centerline along the access road, with a 0.8 mile buffer around the well site. During a six year period (1981-1986) of surveying the area, goats were consistently seen from helicopters in this complex (Joslin, 1986). Numbers seen ranged from 3 to 8 individuals. The estimated population for the Birch-Badger area, which includes the RM-1 Unit and both the North and South Forks of Birch Creek, ranges from 85-119 animals. The proposed road and well site should not preclude movement of goats between Goat Mountain and the Running Owl-Bullshoe Mountain complex, as the developments would be limited to the eastern edge of occupied goat habitat and would not bisect the travel corridors.

Alternative 2 could affect two areas of yearlong goat habitat: 1) the area surrounding Mount Baldy-Kiyo Craig, and 2) the Goat Mountain-Running Owl-Bullshoe Mountain Complex (Map 3.9). The impacts to the Goat Mountain-Running Owl-Bullshoe Mountain Complex would be similar to the impacts discussed for the other roaded alternatives. The effects would be much less in the Mount Baldy-Kiyo Craig area because of the small to non-existent population that lives in that area. During the six year survey period, only one male was seen (Joslin, 1986). This billy goat was seen on the east side of Half Dome Mountain in 1986. Because of the area's low goat population, there would be available habitat for the animals to be displaced there without displacing other animals. Mitigation might be provided by introducing additional animals into this range after drilling activities are complete (Chp.V-Wildlife, #10).

Alternatives 8 and 9 would cause disturbance and displacement of goats similar to those described for other big game species. However, mountain goats appear to react more adversely to aircraft than other ungulates (Joslin, 1986). Because of this and the location of the well site within yearlong goat habitat, there could be a larger displacement zone for goats than would be evident for other animals. The displacement could relate to the openness of the terrain that goats utilize.

Alternative 8 would encroach on fewer acres of goat habitat than alternative 9. The only goat habitat impacted in alternative 8 would be at the well site. With *alternative 9*, the area impacted would be around the well site, as well habitat along the flight path in the Mount Baldy-Kiyo Craig area.

Another impact on mountain goats would be the illegal taking of the animal resulting from improved access. Literature has documented that vehicle access into mountain goat habitat has led to the decline of goat populations throughout the Western United States (Joslin, 1986 and Phelps et. al., 1975). The actual cause of the decline is not known, but it has been determined that road construction has usually been the catalyst. Phelps et. al., (1975) found that increased access into the East Kootenays in British Columbia led to the decline in goat populations through increased legal harvest. These areas were not controlled by permit hunting. The potential for an increase of illegal harvest would be present with the *roaded alternatives*. Legal harvest will not be a factor because the hunting season has been closed for the area north of the South Fork of Badger Creek (Goat Mountain-Running Owl herd).

Four guidelines are recommended in the Interagency Rocky Mountain Front Guidelines to protect mountain goats from the effects of oil and gas development are:

1) Avoid constructing wells, pipelines or roads within 1 mile of occupied yearlong habitat.

2) Use established flight paths to avoid seasonally important mountain goat habitat during the designated use periods.

3) Exploratory well drilling should not occur within occupied habitat.

4) A minimum altitude of 600 feet above ground should be maintained when flying over seasonal goat ranges.

Guidelines 1 and 3 would not be followed should *any road alternative* be used. Guidelines 2 and 3 would not be followed should *alternatives 8 or 9* be used. To follow the guidelines, it would be necessary to relocate the well site out of yearlong habitat or drill directionally. All guidelines would be followed with *Alternative 12* (no action).

d. Black Bear

Effects on the black bear would be very similar to the grizzly bear. Mitigation measures identified to protect the grizzly bear would be applicable for the black bear.

e. Deer

Effects on deer would be similar to elk. Elk are more sensitive to disturbance than deer, therefore if impacts are measured and mitigated for elk they would adequately provide protection for deer.

f. Other Wildlife Species

The effects on all other species would be habitat destruction for small mammals and birds, displacement of species, and potential exploitation of small game and furbearers by the increase of access.

The actual habitat destruction resulting from road construction would be minimal as small mammals and birds could displace to habitats adjacent to the road. If a road was constructed in the spring, some nesting of raptors and passerines could be interrupted resulting in abandonment of nesting sites for one nesting season. In addition, increased road access could result in an increase in trapping of furbearers. These effects can be reduced by restricting road use and or utilizing other road management practices.

Helicopter access would not affect habitats, but may still result in abandonment of nest sites by birds in the general areas of the landing zones.

g. Effects on Migration Corridor Between Glacier National Park and RM-1 Unit

Concerns have been raised about the effects of the proposed activity on the migration or exchange of animals between National Forest System lands and Glacier National Park. It can be assumed that the entire area between Glacier National Park and the Lewis and Clark National Forest could be used by migrating animals. In reviewing the literature, and in personal communications with Montana Department of Fish, Wildlife and Parks (Aune, 1987) and Glacier National Park personnel (Gregory, 1987), it was determined that there are two possible preferred migration corridors for elk and bighorn sheep.

Olson (1981), conducted a study in which four elk were radio collared, and their movements monitored in response to seismic activity in the RM-1 Unit. Of the four elk, only one migrated into Glacier National Park. The crossing was made just east of False Summit, an area that is suited for movement of elk to and from winter ranges, as well as to calving or summer areas in Glacier National Park. Due to the rolling topography in this area, crossing of US Highway 2 is not hindered by high road banks. Sightings of elk and bighorn sheep crossing this area have been noted.

Another area that is suspected to be a travel route (no documented telemetry or sighting evidence), is an area that extends about one mile east from Summit. This area has rolling terrain and dense cover on both sides of the US Highway 2. The ridge between the highway, and the South Fork Two Medicine River, is used by elk in the spring for a calving area. Movement of elk onto summer range in Glacier National Park and adjacent areas is likely to occur at this location.

A study conducted by Ward (1973), determined that migration of elk was blocked by roads of interstate size. However, logging roads, which would be comparable to the proposed roads, did not act as a barrier when traffic was absent. Considering that there presently is movement of elk between the RM-1 Unit and Glacier

National Park, despite the presence of US Highway 2 and the BN Railroad track, it is unlikely that a road the size of those proposed would have a detrimental effect on migration during the period of drilling activity.

Alternatives 1A, 6A, 7A, and 8 could impact the suspected travel corridor east of Summit, because the roads would bisect the travel corridor, requiring the animals to cross the access road, as well as cross the highway and the railroad track. *Alternative 8* would have the most impact, because the total migration corridor could be affected by the helicopter activity. *Alternatives 1B, 6B, and 7B* would have the least impact on the migration corridor. Once the animals cross the highway and railroad track they can move into the summer range on the west side of the South Fork Two Medicine River without crossing the access road. If the animals want to cross the Two Medicine Ridge into the head waters of the Hall Creek, Hyde Creek, Box Creek area, their travel corridor would be bisected by a road and the effect would be similar to *alternatives 1A, 6A, 7A, and 8*. None of the alternatives would effect the documented migration corridor east of False Summit.

Alternative 2 would cross a migration corridor at Whiterock Pass that is used by dispersing elk and bighorn sheep that move from summer ranges to winter ranges. The time that the animals would be most affected would be during the springtime movements when they are in their worst physical shape. This alternative would still be the least impacting of all the roaded alternatives in relation to movements of animals between the Forest and Park lands.

h. Summary of Acres Impacted and Mitigation for the Operation

Figures 4.3 to 4.8 display the total acres involved within the zone of influence for each alternative, the acres of seasonal range involving the species of concern, and the percent of the seasonal range that would be affected in relation to the habitat available in the RM-1 Unit. These are the estimated acreages that would be affected under the various alternatives if Chevron were allowed to operate under a yearlong operation. *The effects of implementing mitigation measures were not included in these figures.*

Table 4.4 compares the acres of wildlife seasonal ranges, within the zones of influence, affected by the various alternatives with no mitigation and the acres affected using various "operating windows" that could be created by applying different guidelines for mitigation for wildlife. If all mitigation measures that are identified in the Rocky Mountain Front Guidelines were used, as shown in Table 3.3, there would not be a window available to allow the drilling of the well at it's present location.

Adhering to all the Rocky Mountain Front Guidlines would result in a "no action" or denial of the APD. Allowing the project to proceed without incorporating wildlife mitigation would result in loss of habitat as shown in figures 4.3 to 4.8. This could adversely affect the wildlife populations that the Rocky Mountain Front Guidelines were designed to protect. An alternative to these extremes would be to analyze various levels of wildlife protection by identifying operating windows (periods when drilling would be allowed to occur), and restricting operations during periods critical to wildlife needs. The effects on wildlife seasonal ranges from several timing options are shown in Table 4.4.

If operations were restricted to protect winter and spring wildlife habitat, a 3 month window (July 15-October 15) would be available. This option would adversely affect yearlong goat habitat.

Should operations be restricted to protect wildlife during the grizzly and black bear spring season, elk calving, and goat kidding season, an 8 1/2 month window would be available (July 15-April 1) for drilling. This would adversely affect goat winter range and breeding habitat, grizzly bear denning habitat, and small portions of elk and moose winter range. A 9 1/2 month drilling window would be available if the mountain goat kidding/nursery period was the only habitat to be protected. This would affect yearlong and breeding mountain goat habitat, elk and moose winter range, grizzly bear denning and one month of grizzly bear spring habitat.

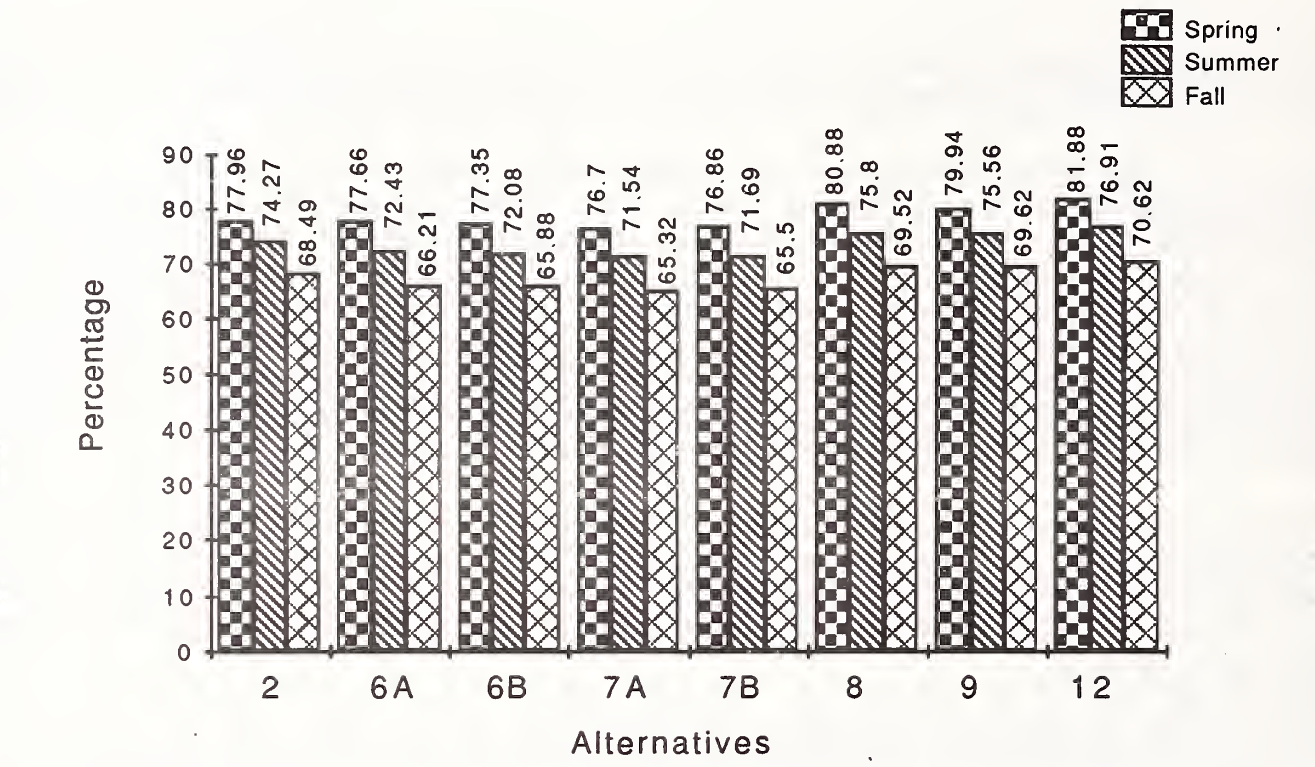


FIGURE 4.1 Grizzly Bear Habitat Effectiveness By Alternative

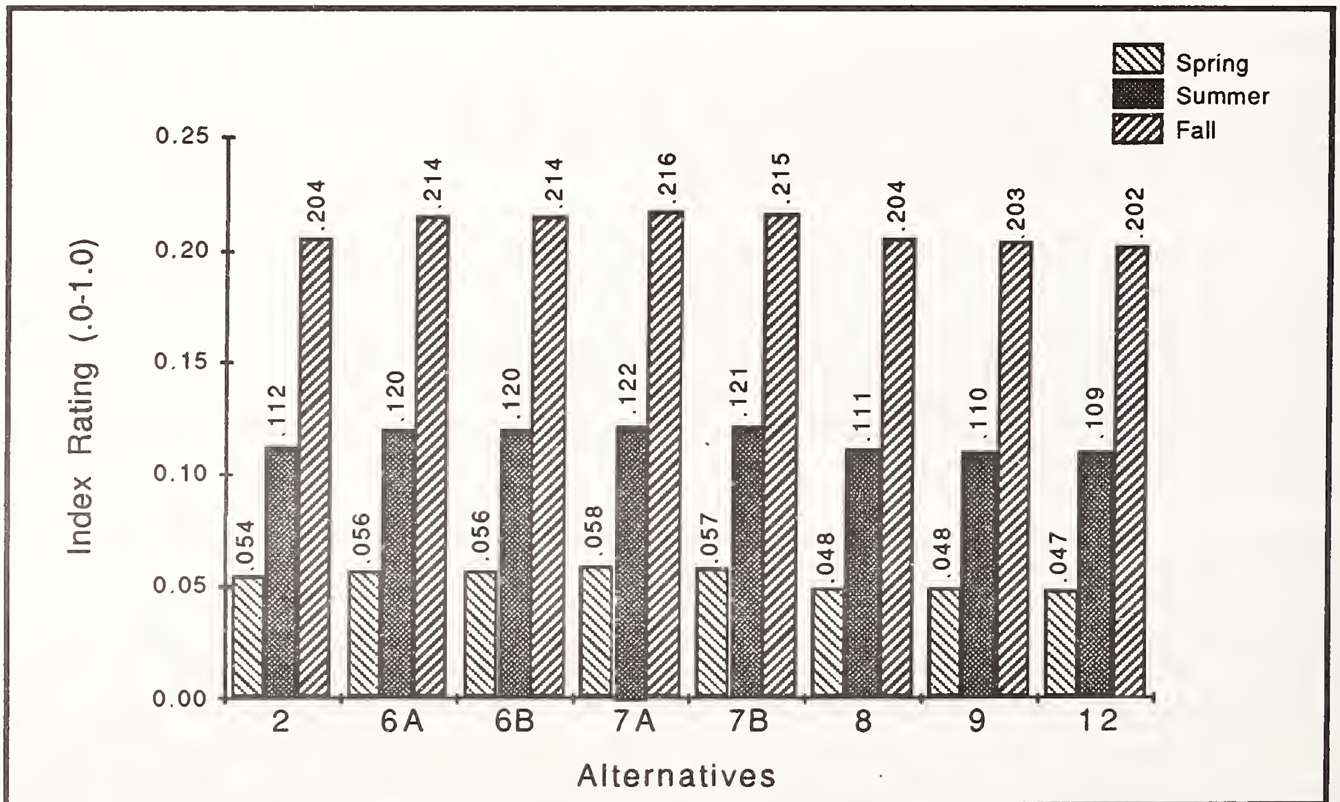


FIGURE 4.2 Grizzly Bear Mortality Risk Index By Alternative

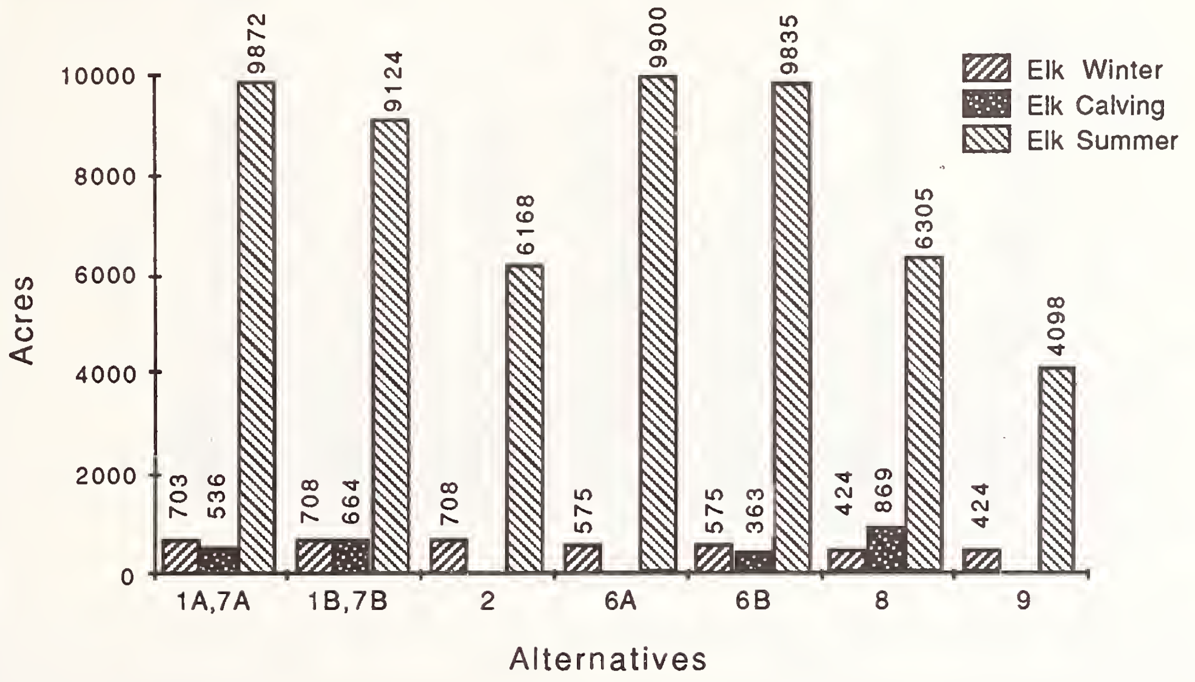


FIGURE 4.3 Acres of Seasonal Elk Ranges Affected

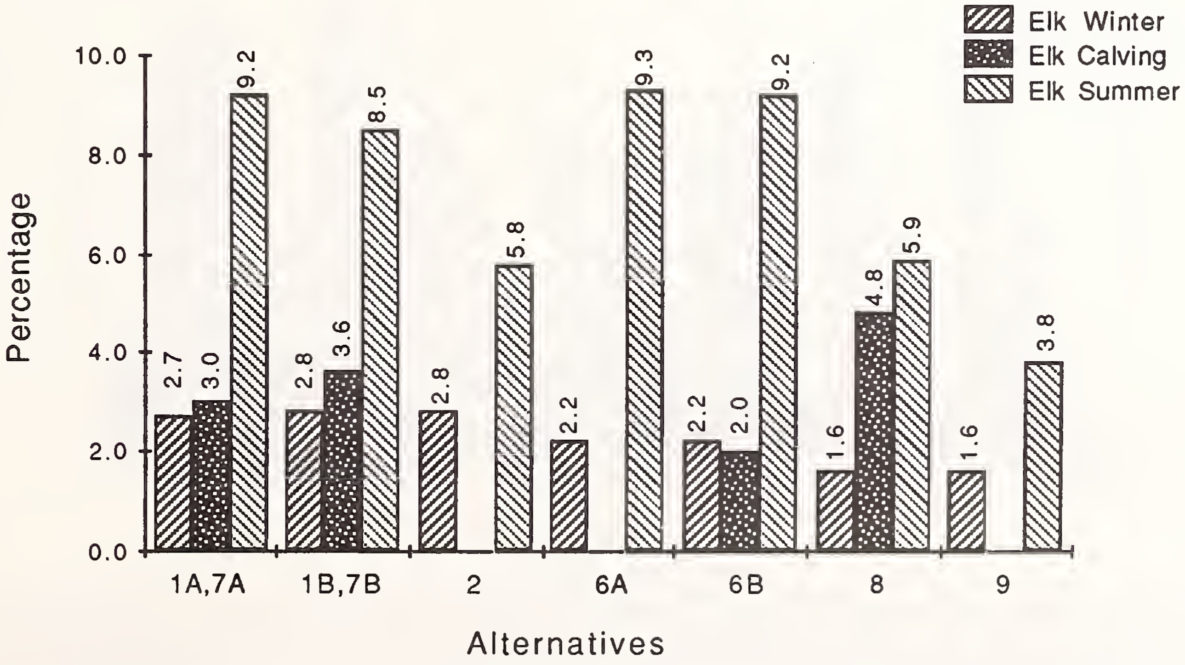


FIGURE 4.4 Percentage of Seasonal Elk Ranges Affected

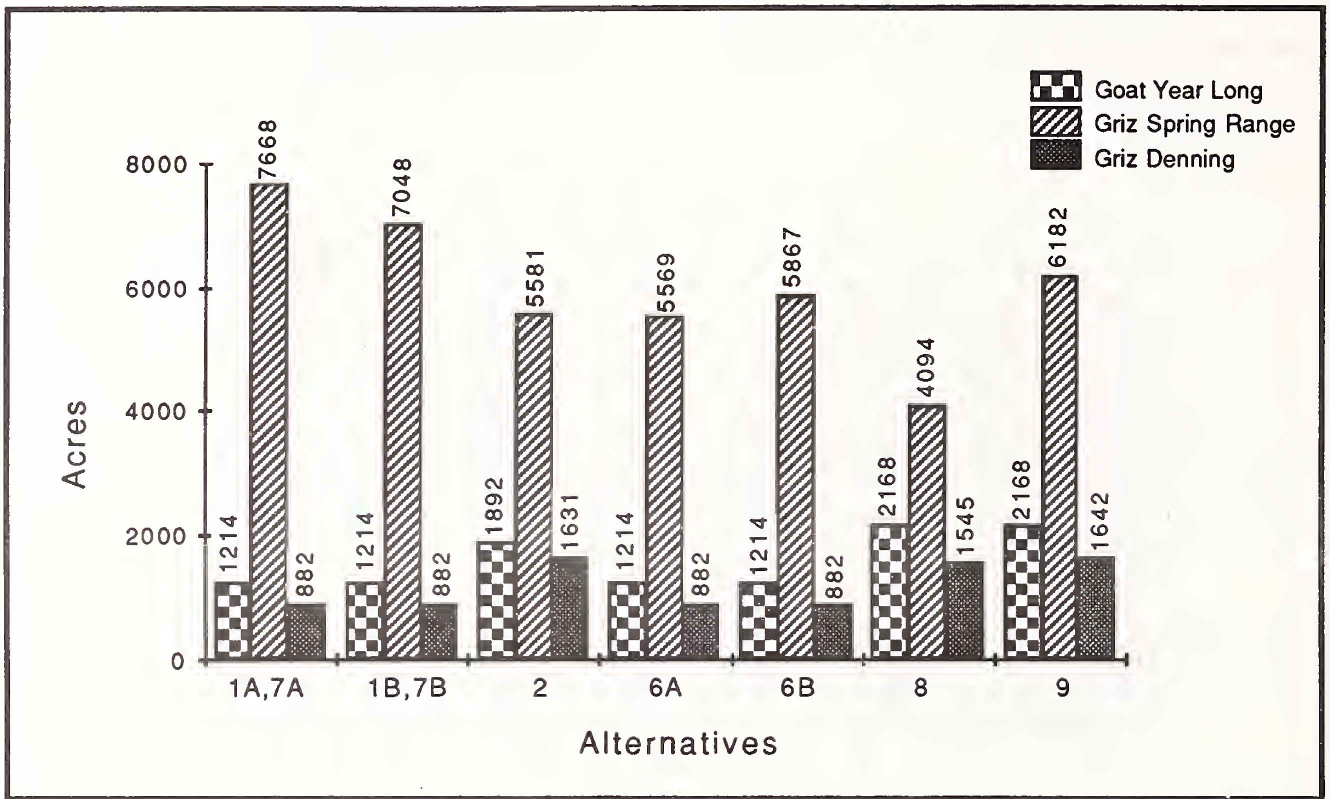


FIGURE 4.5 Acres of Goat & Seasonal Grizzly Bear Ranges Affected

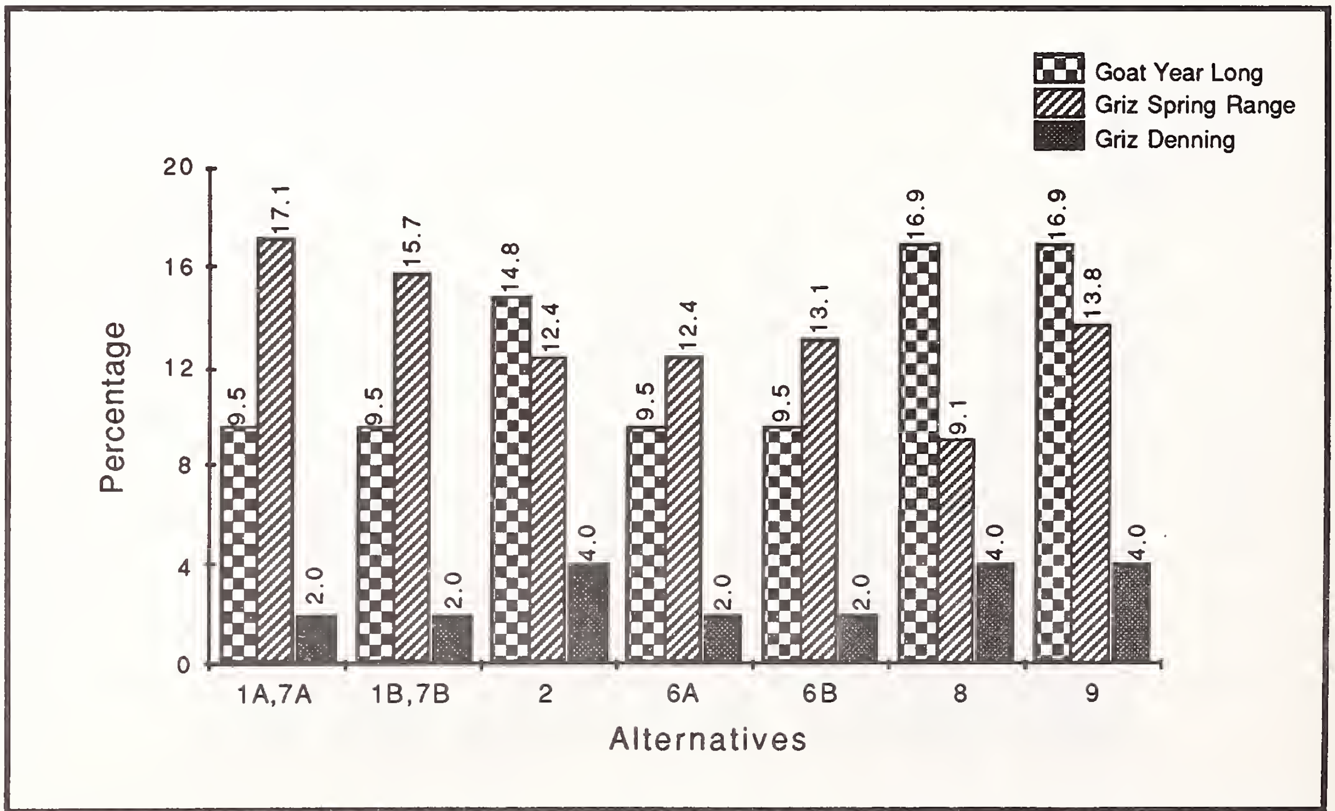


FIGURE 4.6 Percentage of Goat & Seasonal Grizzly Bear Ranges Affected

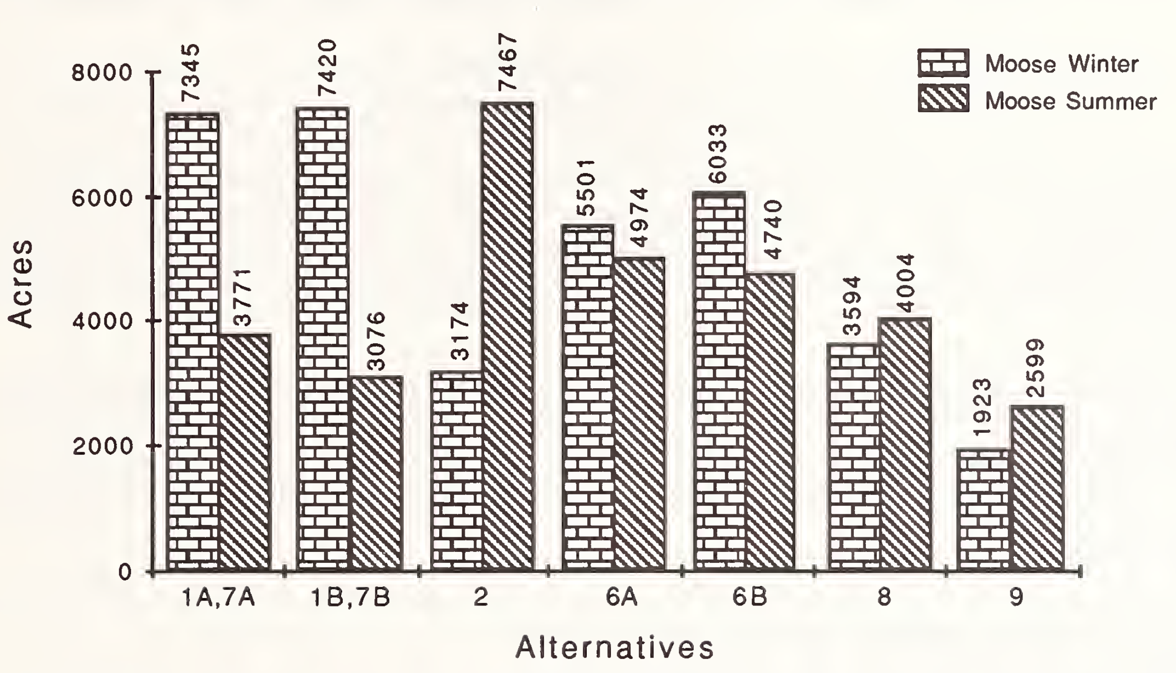


FIGURE 4.7 Acres of Seasonal Moose Ranges Affected

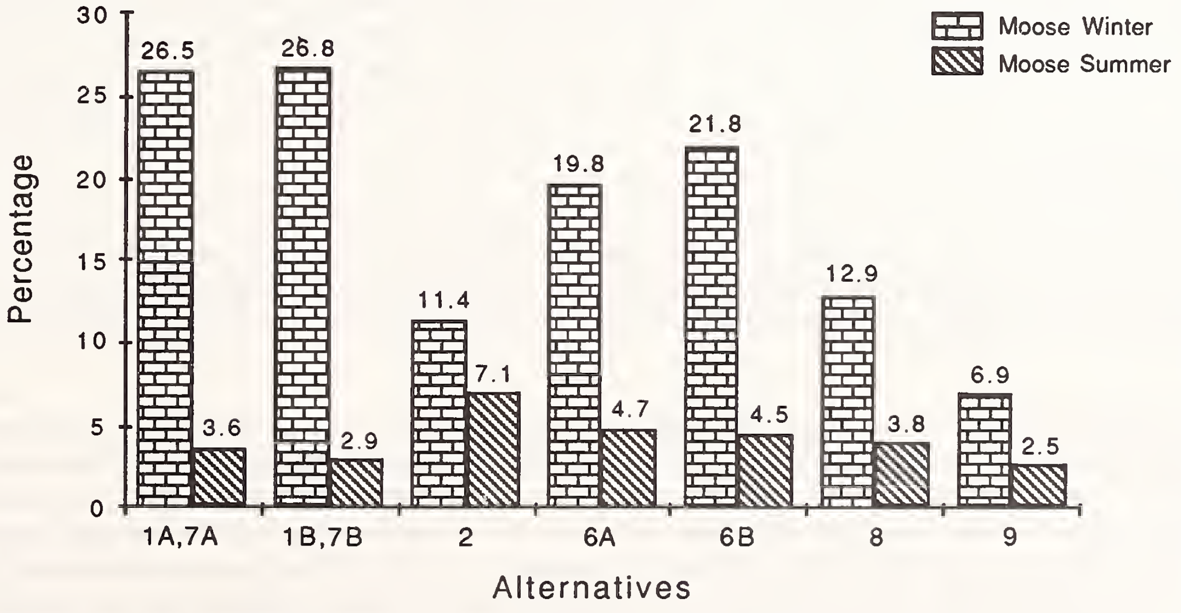


FIGURE 4.8 Percentage of Seasonal Moose Ranges Affected

Table 4.4
Acres of Wildlife Seasonal Ranges Affected With and Without Mitigation

ALTERNATIVES

	1A,7A	1B,7B	2	6A	6B	8	9
No Mitigation[1]	11,116	10,496	10,641	10,475	10,773	7,598	9,686
3 Month Window[2] (July 15-Oct 15)	1,214	1,214	1,892	1,214	1,214	2,168	2,168
8.5 Month Window[3] (July 15-Apr 1)	8,559	8,634	5,809	6,715	7,247	5,762	4,691
9.5 Month Window[4] (July 15-May 1)	10,580	9,832	7,049	10,475	10,410	6,729	9,686

[1] Includes all seasonal ranges listed in figures 4.3-4.8

[2] Includes only yearlong goat habitat.

[3] Includes goat breeding habitat within yearlong habitat, elk and moose winter range, grizzly bear denning habitat (moose winter and grizzly denning added)

[4] Includes grizzly bear denning, spring range, elk and moose winter range, breeding habitat in goat yearlong habitat (subtract elk calving from total zone of influence).

Should an 8 1/2 or 9 1/2 month window be allowed, affects to goat breeding habitat in the form of displacement would be greater than affects on goat winter ranges. Goat breeding season occurs between November 1st and December 31st. The breeding range is a cliff and headwall area in a basin on the northeast side of Goat Mountain. This entire area lies within the zone of influence of the well site and would not be screened by any topography. It is an area of heavy snow accumulation during the late stages of breeding season and during late December through March. Because of the heavy snow accumulation and northeast aspects, the basin is not a desirable area for winter use. During winter months, goats prefer to use south-southwest aspects and wind-swept ridges and consequently move out of the basin to the preferred aspects south of the well site. A major ridge screens the southerly aspects from the proposed well site location, therefore displacement from this area would not be significant.

The adverse effects on such habitats could be further mitigated during project design and administration. This would involve site-specific mitigation that would be applied only in final design and execution of the project. Such measures are identified as General Management Guidelines in the Rocky Mountain Front Guidelines (1987).

In summary, moose winter ranges and yearlong goat habitat would be affected the most by the proposal. Table 4.4 shows that by imposing some type of mitigation for wildlife, *alternative 9* would affect the least amount of wildlife habitat of all the alternatives. *Alternative 2* would effect the least amount of wildlife habitat of the roaded alternatives. This table does not reflect the quality of the habitat being affected. In reviewing telemetry data for the elk and grizzly bear, there appears to be a major concentration of animals in the area that lies north of Deep Creek to US Highway 2, and the area between the South Fork Two Medicine River and the Continental Divide. The preference of grizzly bear and elk to use these areas indicates a higher quality habitat than along the alternative 2 corridor. While there would be more acres affected under alternative 2 for some windows, the overall effect could be less, because the area is of lower quality and used by fewer animals. Therefore, affects to wildlife species could actually be less along the *alternative 2* (Whiterock Pass) corridor than for those alternatives following the South Fork Two Medicine River corridor (*alternatives 1A, 1B, 6A, 6B, 7A, 7B, and 8*).

The total acres disturbed by the helicopter alternatives are very close to the roaded alternatives. The advantage of a helicopter alternative would be exploration without constructing a road which would reduce legal and illegal taking of wildlife species, and the need for administration of any roadway.

Based on the affects disclosed in Table 4.4 and the biological evaluation for threatened and endangered species (Appendix F), an 8 1/2 month window for operation and additional trail closures are recommended for wildlife mitigation (See Chp. V). This will lessen the effects to wildlife seasonal ranges on the high end by 52% for *alternative 9* and on the low end by 18% for *alternatives 1B,* and *7B*.

In order to reduce the increased mortality to wildlife species, the general public would not be allowed to travel the access routes with motorized vehicles. In addition, operations personnel would be prohibited from carrying firearms (refer to Chp.V-Mitigation and Monitoring). These restrictions are based on the reduction of mortality risk to the grizzly bear measured by the cumulative effects model (Appendix F).

The biological evaluation stresses the importance of minimizing conflicts between humans and grizzly bear. It is recommended that a crew camp not be allowed at the well site. A crew camp could be located in the grasslands on the Blackfeet Reservation away from Little Badger Creek if the Blackfeet Tribe would consider it and if Chevron would desire that location. This would greatly reduce the possiblility of human/bear confrontations and thereby reduce the risk of having to take action against a bear that may be attracted to the drill site.

Reasonably Foreseeable Actions

A Dry Hole

For the purpose of this analysis it is anticipated that Chevron would request to drill another well to fully explore their lease and that the second well site would be along the proposed road corridor between the first well site and the North Fork of Badger Creek. The effects on wildlife would be similar to that for the original exploratory proposal. The same mitigation, for drilling the second well would apply.

A One Well Production

Uncontrolled travel (not mitigated), would affect wildlife in the following ways: 1) Increased use of the area by motorized and nonmotorized users, 2) Increased legal and illegal harvest of big game, small game, and furbearers, and, 3) Long-term reduction in habitat effectiveness along the travel corridor. These effects could be lessened by imposing restrictions on the number of visits by oil companies, the use of remote monitoring methods of the wellhead and pipeline, the restriction of recreational use on the road during critical wildlife seasons and by coordinated law enforcement of the area by all responsible agencies.

Alternative 1A or 1B would utilize an existing primitive road for most of the distance to the well site, and is considered only temporary access. Another route would have to be selected for a long-term production road and the pipeline. Clearing for an access road and pipeline would cause impacts to wildlife similar to those discussed for the exploratory proposal, with additional disturbance to wildlife. Helicopter access *alternatives 8 and 9* would be similar to Alternatives 1A and 1B because an access road and possibly a pipeline would have to be constructed for production.

Under *alternative 6A or 6B*, the pipeline could be placed in the road right of way. The major effect on wildlife for this route, as well as the other alternatives, would be the creation of permanent access to the area. These two alternatives access the west side of the South Fork Two Medicine River.

Telemetry data gathered on elk by the Montana Department of Fish, Wildlife and Parks shows that the key summer range lies on the west side of the South Fork Two Medicine River in the drainages of Lee Creek, Lost Shirt, and Sidney Creek. No radio collared animals used the Pike Creek area, though on-the-ground surveys have shown elk use in this area. Construction in this area would reduce the habitat effectiveness over a corridor that would be approximately 1.25 - 1.5 miles across (due to a road corridor on the west side and a trail corridor on the east side of the South Fork Two Medicine River).

Alternatives 7A and 7B would facilitate production. There would be a long term benefit to relocate the existing trail along the South Fork Two Medicine River out of the riparian zone. In some cases, this would allow for as much as a one-half mile buffer between the trail and the river. This could have a positive effect on wildlife habitat by reducing motorized use in the riparian zone.

Production under *Alternative 2* would require lifting stations with more visits by maintenance crews. Presently, the road is open from Palookaville to Whiterock Pass from July 1 - December 1, with no restrictions on the type of use. The road from Whiterock Pass to Badger Cabin has motorized (all terrain vehicles) recreation and administrative use traffic from July 1 - December 1. Comparing the wildlife sighting information provided by Aune (1986), Olson (1981), and Joslin (1986) to the other alternative road locations indicates that this route would be the least disrupting to wildlife.

A Field Production

Effects that were discussed for production of one well would be applicable for field production. These effects would result in increased disturbed acres and length of time that the area is affected by the operations. The original helicopter alternatives are incorporated into some type of roaded access because of production requirements.

Additional effects would be created with access roads to other well locations and additional facilities. A comparison of the zone of influences affected by the South Fork Two Medicine River corridor and the Whiterock Pass corridor shows the two corridors are very similar in total acres affected. The quality of habitat affected and the ramifications of long term access through high quality and highly utilized habitat indicates that the least impact to wildlife habitat would occur along the Whiterock Pass corridor.

The amount of disturbance to the habitats associated with the Whiterock Pass corridor would be directly correlated with the type of operation needed to transport hydrocarbons from the well site to the production facilities. If the gas or oil could be transported via pipelines to production facilities on the Blackfeet Reservation, it is anticipated that daily well site visits would not create much more disturbance than already exists during the summer and fall months (recreation, administration, livestock, and firewood activities). Should some type of production facility be located near Badger Cabin, there would be a definite increase in habitat reduction due to activity that does not exist at this time. Mitigation (Chp.V) that is applied for the drilling of the exploratory well would also apply to pipeline and production facilities construction.

H. FISHERIES

The five major concerns expressed during the scoping process pertaining to fisheries (see Appendix D for more information on scoping) were as follows: 1) Sedimentation effects on spawning fish, 2) Injury and mortality to fish from diversion structures, 3) Road crossings and impoundments, 4) The downstream effects on fisheries of North Badger Creek and the Two Medicine River and, 5) The effect hydrogen sulfide would have on fisheries. In addition, North Badger Creek has been assessed by the Lewis and Clark National Forest as an eligible river under the 1968 Wild and Scenic Rivers Act. As an eligible river, North Badger Creek is assigned a potential classification of "scenic" with an outstandingly remarkable fisheries resource. A concern identified by the ID Team is the potential effects of the proposed activity on the outstanding fisheries resource of North Badger Creek.

This section describes how trout populations and certain trout habitat components (spawning and rearing substrates) are likely to be affected by implementing the various alternatives for the proposed Chevron project. The degree of effect on trout habitat and population are discussed in terms of the following factors: 1) Increases in sediment production (yield) to streams due to road construction (exploration and production phases), 2) Potential for oil spills and pipeline rupture (production phase) and effects of hydrogen sulfide on stream quality, and 3) Increases in fishing pressure associated with improved access into the analysis area (exploration and production phases). These effects would also be related to the outstandingly remarkable fisheries resource value of North Badger Creek. The potential effects of the proposed activity on North Badger Creek as an eligible "Scenic" river are discussed under section IV.1.J-Outdoor Recreation.

Mitigation measures are also discussed where applicable (see Chp.V-Mitigation and Monitoring, Water Resources and Fisheries, for more information on mitigation). No discussion of reductions in fish passage capability is included as fish passage will be provided on all fishery streams.

Exploration Proposal

a. Sedimentation Effects

Road building would be one of the biggest contributors of sediment to stream systems (Yee and Roelofs, 1980). Sediment has been shown to limit fish reproduction and populations in some situations (Bjornn et al., 1977; Alexander and Hansen, 1983; Witzel and MacCrimmon, 1983).

The Forest Services' Northern Region has adopted a model to display how sediment can affect egg survival and overwinter survival of fingerlings for several salmonid species (Stowell et al., 1983). Figure 4.9 depicts how the amount of fine sediment can reduce trout egg survival. Figure 4.10 depicts how changes in embeddedness (the degree to which spaces between stream cobbles is filled with sediment) can affect overwinter survival of cutthroat trout fry.

An analysis of the cumulative sediment production (yield) associated with this project indicates that the estimated increases in sediment production associated with *all roaded alternatives* would be less than 2 percent over a 5-year period, assuming gravel surfacing and slash filter windrows would be an integral part of all road construction (Table 4.1) (Refer to Section IV.1.B-Water Resources for more information on sediment production). This increase should not result in measurable amounts of fine sediment within spawning gravels or in increased embeddedness within rearing areas for streams within the project area.

A cumulative sediment analysis has been conducted (see Section IV.1.B-Water Resources). This analysis is the basis from which the potential effects on fisheries are determined. Statistically significant increases in sediment (at the 80%, 90% or 95% confidence levels) within the spawning gravels would not occur, due to the natural variability in the streams-even if the sediment predictions were off by 100 percent. Because measurable changes to habitat parameters should not occur, changes in the fish population would not be expected from the projected sediment increases for any of the alternatives.

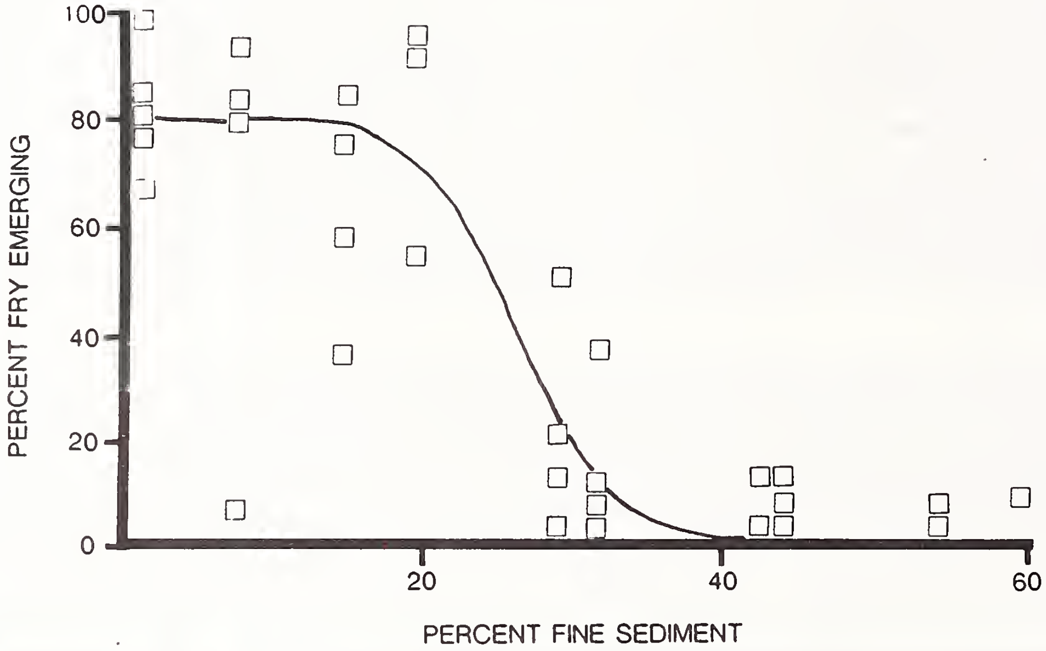


FIGURE 4.9 Fine sediment by depth versus alevin (Fry) emergence response curve for rainbow steelhead trout

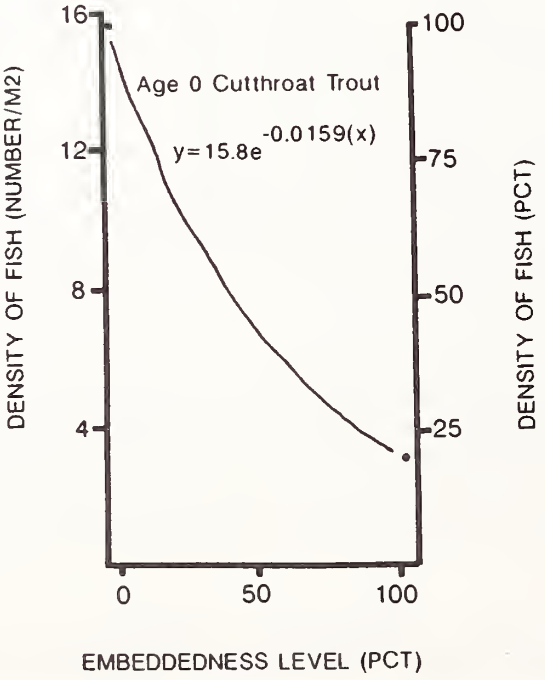


FIGURE 4.10 Relationship between winter carring capacity of poolsand substrate embeddedness for age 0 cutthroat trout

Mitigating measures (Best Management Practices) could be used to reduce sediment production and delivery from roads by 20 to 80 percent -depending on the type and intensity of Best Management Practices used (Hancock, 1987). It should be noted that even with implementation of Best Management Practices, it could be possible during an extreme storm event that sediment delivery to North Badger Creek could be increased to the point that spawning and rearing habitats for fish would be negatively impacted. However, it is projected that sediment delivery to North Badger Creek would have to increase by 200% over current levels for a 10% reduction in the rearing habitat of cutthroat trout. This figure (200%) was calculated using the fish sediment model of Stowell et al. (1983) using existing conditions as determined by field measurements.

Road construction activities in the vicinity of North Badger Creek would conform to Management Standards W-2 of the Wild and Scenic River Study, Amendment II of the Lewis and Clark National Forest Plan (Forest Service, 1989) to protect the water quality and fisheries resources of North Badger Creek, as well as other streams in the RM-1 Unit. Sediment delivery in the RM-1 Unit would be monitored in the event of road construction and drilling activity (see Chp.V-Mitigation and Monitoring, Water Resources and Fisheries).

Alternatives 8 and 9 involve helicopter access. There should be little or no increases in sediment delivery to streams within the analysis area for these alternatives.

b. Effects of Increased Access

Adverse effects are not anticipated under any of the alternatives. Also see discussion under A Field Production.

c. Potential Effects of Oil Spills or Pipeline Rupture and Hydrogen Sulfide on Fisheries

Adverse effects are unlikely in conjunction with any of the alternatives discussed. An oil spill, pipeline rupture and hydrogen sulfide release are more likely to occur under production, and are therefore discussed under the production scenarios.

Reasonably Foreseeable Actions

A Dry Hole

The effects on the fisheries will be similar to that described for the exploration proposal, should the first well prove dry, and Chevron decides to drill another well. The duration of effects would be for a longer period of time. The same mitigation would apply as for drilling the first dry well.

A One Well Production

a. Sedimentation Effects

Sedimentation effects would be similar to those for the exploration proposal, but for a longer duration of time.

For *Alternatives 8 and 9*, access for service and maintenance of the well site would require road construction. The access would probably be one of the roaded alternatives discussed for the exploration proposal, with similar effects, and for a longer period of time.

b. Effects of Increased Access

See discussion under A Field Production.

c. Potential Effects of Oil Spills or Pipeline Rupture, and Hydrogen sulfide on Fisheries

Petroleum products could be in the form of natural gas, liquid petroleum, or both. If natural gas is produced, a pipeline would be the likely method to transport the gas. The pipeline could be placed within the right-of-way of the access road. If liquid petroleum is produced, delivery could be by pipeline or truck, depending on quantities involved and the nature of the liquid produced.

Oil (or condensate) spills from a truck accident or pipeline rupture could have a detrimental effect on the fish habitat, depending on the amount of oil spilled and stream flow rates. Woodward et. al., (1981) found that concentrations of crude oil of 520 ppb (parts per billion) over a 90 day period resulted in 48% mortality of cutthroat trout. The "no effect" level was determined to be less than 100 ppb in this same study. Concentrations of oil in the water must be higher then those described above to cause mortality over a shorter time period.

The risk to fish habitat as a function of oil spills would be dependent upon the risk of a loaded truck accident or pipeline failure, and the potential for spilled oil to reach the fishery. It is assumed that the risk of pipeline rupture or truck accident would be the same for all alternatives, while the potential for delivery to stream systems varies, depending on the number of times the service road or pipeline crosses streams and the proximity of the pipeline to streams. Alternatives with greater potential for oil spill delivery to stream systems pose a greater threat to the fisheries than streams without delivery.

Rupture of a buried gas line containing hydrogen sulfide could be toxic to fish, if the rupture occurred at an underwater crossing. Hydrogen sulfide is toxic to fish at concentrations of less than one part per million when in water. The extent such a leak could adversely affect fish, would depend on the amount of gas released, and the dilution effect of the stream (considering such variables as water quantity, movement, and temperature). The risk of toxic releases could be reduced by removing hydrogen sulfide from the gas near the well site before stream crossings were made. The amount of gas released into the stream could be reduced by having block valves installed in the pipelines adjacent to stream crossings. This would only allow the amount of gas in the section of pipeline under the streambed to be released by a break. The relative risk of leaks by alternative, would be the same as that discussed below for oil spills.

All road and pipeline alternatives would have to make one crossing of North Badger Creek. The risks to fish habitat would be as described above for all alternatives because the access routes cross North Badger Creek at essentially the same location for all alternatives. If the outstanding fisheries resource of North Badger Creek was degraded through sediment delivery or a hydrocarbon spill, North Badger Creek may no longer be eligible for designation as a Wild and Scenic River.

Alternatives 1A and 1B would have the highest risk of oil delivery to the South Fork Two Medicine River due to the number of river crossings, and the general proximity of the road to the stream. Risk for the upper reaches of side tributaries would be low as all crossings would occur near the confluence of tributaries with the mainstem river. A pipeline route, different from the access road, would be necessary to reduce the potential effects of a pipeline leak or spill.

Alternatives 6A and 6B would pose a moderate risk of oil delivery to the South Fork Two Medicine River due to proposed crossings on Benson and Sidney Creeks, as well as on four other streams of lesser fishery importance. There are no crossings of the mainstem of the South Fork Two Medicine River. The upper reaches of tributary streams would have low risk, as all crossings would be occurring within one-half mile of the confluence of the tributary with the main South Fork Two Medicine River.

Alternatives 7A and 7B would require pipeline crossings of Woods Creek and five other tributary streams containing fish. There would be one pipeline crossing on the South Fork below Pike Creek. As with alternatives 6A and 6B, the risk to the upper reaches of tributary streams would be low. The overall risk of oil delivery to the South Fork Two Medicine River drainage, should a rupture occur would be moderate.

Alternative 2 would have a low risk potential for oil delivery to the South Fork Two Medicine system, as the only stream crossings within the South Fork drainage are in the upper reaches of Whiterock Creek. This alternative would result in a crossing of the North Fork of Little Badger Creek, which does not occur with any of the other alternatives.

A Field Production

a. Sedimentation Effects

Impacts discussed for the one well production would apply to the field production. The sediment production and delivery to streams resulting from this additional activity would result from increased access. This effect would occur throughout the life of the field until reclamation has been completed. The estimated levels of increased sediment yield would not affect the fisheries resources in the RM-1 Unit over the life of the field.

b. Effects of Increased Access

Increased access could be very detrimental to fisheries. For instance, moderate fishing levels have been shown to greatly reduce numbers of catchable-sized cutthroat trout in northern Idaho (St. Joe River and tributaries, Kelly Creek, Clearwater drainage)--even where access was not well developed (Thurow and Bjornn, 1975).

The improved access would not be expected to result in a large increase in fishing pressure initially. However, as ease of access into the area became common knowledge, and word of good fishing spread, fishing pressure would probably increase. The streams most likely to be impacted by increases in fishing pressure would be the South Fork Two Medicine River, North Badger Creek, Sidney and Benson Creeks. The other tributary streams in the vicinity of the proposed roads that support fish would be too small to attract much angler use.

Alternatives 1A, 1B, 6A, 6B, 7A, and 7B would result in improved access to North Badger Creek and the upper reaches of the South Fork Two Medicine River during the exploration phase. With production, this effect would extend over many years.

Alternative 2 would not result in improved access along the upper reaches of the South Fork Two Medicine River or its fishable tributary streams. Access would be improved to North Badger Creek.

Alternatives 8 and 9 involve helicopter access, and would require the construction of access roads and pipelines to service and maintain the well field. Sediment effects would depend on the route selected for road access (See other alternatives for estimated sediment impacts).

Fishing pressure would be limited by mitigation measures. These measure include restricting motorized access to all persons except project and administrative personnel from any roads constructed for the project activities and any roads currently unavailable for motorized use year-round (see Chp.V-Mitigation and Monitoring, Access Management, for more information). Such restrictions would limit fishing pressure to near current levels. It could become necessary to implement more restrictive fishing regulations.

c. Potential Effects of Oil Spills or Pipeline Rupture, and Hydrogen Sulfide Effects on Fisheries.

Effects of any oil spill or pipeline rupture on fisheries would be similar to that described for the one well field. With development of a field, the risk of an oil spill or pipeline rupture would increase and would exist for a longer period of time.

I. VEGETATION

This section discusses the potential impacts to native plant communities. Five issues and concerns were identified during the scoping process: 1) Direct, mechanical damage to existing vegetation; 2) Impacts resulting from chemicals which might be introduced during the course of the project; 3) Potential for encouraging the spread of noxious weeds; 4. Impacts to plants listed as rare or endangered, and 5) Potential impacts to livestock grazing, and to the permittees presently grazing the project area.

Mitigation measures that would be needed to minimize the effects are discussed, as applicable.

Exploration Proposal

a. Loss of Existing Vegetation

Actual physical disturbance to existing vegetation would occur during construction activities on proposed roads, and clearing for the drill site and staging areas. Using mapped landtypes for the RM-1 Unit (Holdorf, 1981), the proposed disturbance activities have been estimated in terms of approximate acres by alternative for each of six current vegetation groupings, and are listed in Table 4.5. Existing roads requiring reconstruction would not likely involve significant new clearing or the potential for additional loss of existing vegetation.

Alternatives 1A, 1B, 2, 6A, 6B, 7A, and 7B, would have a potential loss of 80 acres of existing vegetation due to physical disturbance. The removal of existing vegetation from the open forest, closed forest, or grassland types would represent a very small percentage of what is presently available in the South Fork Two Medicine and North Badger Creek drainages. The removal of vegetation should not threaten the relative abundance or geographical range of a plant or tree species occurring in the area. Impacts to these vegetative communities would be direct, i.e., physical removal of vegetation from specific sites and the possibility of some minor reduction in plant or tree vigor adjacent to roads or sites where dust, or emissions from vehicles or machinery is concentrated.

The potential for somewhat more significant impacts would be in the road segments in or adjacent to the riparian zone of the upper South Fork Two Medicine River, as proposed in *alternatives 1A and 1B*, and to a much lesser extent in *alternatives 7A and 7B*. The vegetation occurring along this river bottom would be much more restricted, and in this case, the loss of 13 acres of riparian vegetation from this valley could be considered significant. Species most likely to be affected would be cottonwood, aspen, willow, and some of the more succulent forbs and grasses that are of primary importance to wildlife for food and cover. It could be conceivable that the removal of stands of large trees along the river bottom could change flow patterns of the river, possibly resulting in the loss of riparian vegetation. Any activity occurring in wetland or floodplain areas would be regulated by Executive Orders 11988 and 11990 (May 24, 1977), which set forth the direction and responsibility for agencies in reducing the risk of adverse impacts to these sensitive areas. Mitigation measures are outlined in Chp.V-Mitigation and Monitoring, Water Resources and Fisheries, for the protection of wetland and floodplain areas.

Alternatives 8 and 9 would result in a direct loss of 11 and 7 acres, respectively, of coniferous forest vegetation at the well site and approximately 3 acres of upland conifer or grassland vegetation at staging areas.

There is also a risk of fire, which would result in conversion of forest and grassland vegetation types. The greatest risk of an operations-caused fire would be with *all roaded alternatives*. Road construction activities, right-of-way slash disposal, and burning under optional burning conditions could increase the risk of an uncontrolled fire. Burning and use of fire to consume right of way slash would be controlled by operator permit and by the State fire regulations. The risk of a worker caused fire would be small for all alternatives. Chevron would be required to comply with State fire regulations and their stipulations regarding fire safety (Appendix A).

b. Chemical Damage to Existing Vegetation

There is the possibility that a chemical spill would cause a measurable effect on vegetation. Spills of petroleum products associated with this project could result in loss of vegetation adjacent to areas where vehicles and machinery are operating. A chemical spill into live water could cause a loss of vegetation for a considerable distance downstream. Spills along upland roads would likely be very localized and not affect surrounding vegetation.

Alternatives: 1A, 1B, 2, 6A, 6B, 7A, and 7B, would pose the greatest risk to vegetation, as a wider variety of vehicles would use the access roads. Probably the highest potential for risk would be with *alternatives 1A and 1B*, with construction and use of a road along sections of the South Fork Two Medicine River.

Table 4.5
Estimated Acres of Vegetation Removed or Disturbed

					Acres of Disturbance by Vegetative Type						
	Road Acres*		Drill Pad	Staging	Closed Forest		Open Forest				
Alt	Re-const	New Const	Acres	Acres	LPP [1]	LPP [2]	LPP [3]	[4]	Grass lands[5]	Wet lands[6]	Total
1A	.7	73.3	5		39	10	17				79
1B		74.7	5		40	10	17			13	80
2	2.6	60.6	5		25	14	22	3	4		68
6A	.7	67.8	5		51	14	8				73
6B		72.9	5		56	14	8				78
7A	.7	72.5	5		47	10	18			2	77
7B		73.8	5		49	10	18			2	79
8		4.2	7**	3	11		3				14
9			7**	3	7		3				10
12											0

[1] Includes lodgepole pine/Douglas fir types with a beargrass understory.

[2] Includes lodgepole pine/Englemann spruce/subalpine fir types with menzesia or vaccinium dominated understory.

[3] Lodgepole pine forest and fescue grasslands occasionally intermixed with aspen stands.

[4] Very steep areas of scattered Douglas fir, Englemann spruce, subalpine fir, or limber pine on rock and scree.

[5] Open fescue-dominated grasslands.

[6] Floodplains and wet areas of mixed vegetative types.

* road acreages are based on construction of a 14 foot wide road with 2:1 fill slope and 1 1/2:1 cut slope; allowing 10 feet extra clearing width (total clearing width of 35 feet). Disturbance will be greater for roads constructed on slopes over 25%; and less where roads are constructed on slopes less than 25%.

** includes a crew camp

Alternatives 8 and 9 would pose a risk to the vegetation resource, should harmful chemicals be carried by helicopter. The potential for contamination would occur, should a load be lost or a helicopter crash.

Impacts similar under *all action alternatives* would involve chemicals introduced to the drill site, either by vehicle or helicopter, and those chemicals associated with the natural oil and gas resources which may be present under the ground. Introduced chemicals could conceivably be lost adjacent to the drill pad where native vegetation could be adversely affected. In all likelihood, such spills would involve very small quantities and have minimal impacts on the drilling area. Safeguards would be required in the permit to reduce the potential for such spills.

Any effect to vegetation from a release of hydrogen sulfide or other gases is discussed in Health and Safety (Section IV.1.O.).

c. Introduction of Noxious Weeds

Alternatives 1A, 1B, 2, 6A, 6B, 7A, and 7B, could result in the introduction and spread of noxious weeds. The two principle methods for weed dispersal would be via vehicles and water courses. Noxious weeds, such as spotted knapweed, leafy spurge, and Canada thistle are present all along the Rocky Mountain Front, including several sites adjacent to roads and rivers on National Forest System lands.

Alternatives 1A and 1B would have the highest risk for introduction and spread of noxious weeds, since they involve not only vehicle access, but the potential for weeds to be dispersed along the South Fork Two Medicine River and carried downstream and outside the project area.

Alternative 2 could have the highest potential for establishing noxious weeds. This route contains the highest percentage of grassland and open forest types, most susceptible to wind - a common agent of weed dispersal.

Alternatives 8 and 9 would pose the least risk of introducing weeds during exploration, as there would be no major road construction.

Forest objectives for noxious weed management were identified in the Lewis and Clark National Forest Noxious Weed Control Environmental Impact Statement (Forest Service, 1986c). These objectives are:

1. To prevent or reduce the invasion of noxious weeds, with a prevention program.
2. To control and/or contain noxious weed populations on National Forest System lands in cooperation with State and County weed control organizations and individual permittees and cooperators.
3. To maintain a dynamic, on-going noxious weed inventory and program of monitoring noxious weed populations with effective noxious weed control.

To meet these objectives, a number of practices, including prevention, control, and monitoring would be required to control and eradicate noxious weeds during the period of operation, and for at least two years following completion of final project reclamation. With such control practices, the introduction and spread of noxious weeds in the RM-1 Unit is unlikely.

d. Plant Species of Special Concern

No plants listed as threatened or endangered under the Endangered Species Act are known to occur in the project area. Plants of special concern, as listed in Appendix H, may occur in the area. Site specific surveys would need to be conducted, should the project be approved, and measures would be taken to protect the species. Such surveys would be conducted by Forest Service, or may be conducted by Chevron under its lease stipulation MSO 3100-47c. If rare or sensitive plants are identified, management requirements on a site-by-site basis will be developed to allow continued existence of the plant.

e. Livestock Grazing

The implementation of any of the roaded alternatives could have some minor effects on livestock grazing in the northern portion of the RM-1 Unit. However, reductions in available forage would be minimal and temporary (assuming that roads would be revegetated following exploration activities).

If road use associated with drilling coincided with the permitted grazing seasons on one or more of the allotments, some coordination would likely be necessary for moving livestock on and off the Forest and for herding activities. There would be increased hazards to livestock when heavy vehicles were travelling through grazing areas.

Alternative 12 (no action) would cause no change in any of items a. through e. above.

Reasonably Foreseeable Actions

A Dry Hole

The effects of drilling a second well would be similar to those discussed for the exploration proposal, except any effect would occur for a longer period of time. There may also be somewhat more vegetation disturbed depending on the location selected for the second well.

A One Well Production

Under *all roaded alternatives*, some additional vegetation would be lost, if a pipeline is constructed. The amount of vegetation loss would depend on whether the pipeline could be placed within the road clearing limits. This cumulative impact would be short term, extending only until final reclamation is achieved.

For *alternatives 1A and 1B*, a permanent access road would have to be constructed out of the South Fork Two Medicine River bottom. This would result in increased acres of vegetation disturbance. The temporary road used for the exploration well would be reclaimed in accordance with recommendations in Appendix K.

For *alternative 8 or 9*, an access road and a pipeline would have to be constructed, using one of the routes identified under the roaded alternatives. The loss of vegetation would be similar to that discussed for the exploration proposal.

Additional risks of chemical damage to vegetation would occur with the well going into production. If any hydrocarbons are trucked out, there is the possibility of a spill from a vehicle accident. There would also be the possibility of a leak or spill from equipment during pipeline construction activities and the chance of a break in the pipeline after production begins. Impacts would be potentially more severe if the pipeline location was in the valley bottom where gases would tend to concentrate and disperse slowly or where chemicals could be introduced into water.

The potential for introduction of noxious weeds would be similar to that discussed for the exploration proposal, and would continue for the life of the well.

Site specific surveys would be conducted prior to any ground disturbance as described in the exploration proposal, and measures taken to protect any sensitive or rare species found.

The effects to livestock would be similar to that discussed for the exploration proposal, and would continue for the life of the well.

A Field Production

Some additional loss of vegetation would occur during drilling activity and development of the field. The amount of vegetation loss would be dependent upon the location of wells, in relation to any existing access roads constructed. An estimated 2 - 10 additional acres of existing vegetation could be lost during drilling and development of the field. The effects to vegetation communities would be similar to that described under the exploration proposal.

The potential for spills of petroleum products would increase with the additional activity. The risk of adverse impacts resulting from spills would be reduced per Executive Orders 11988 and 11990, as discussed for the exploration proposal.

The risk for introducing noxious weeds would be similar to that discussed for the exploration proposal, and would continue for the life of the field.

Site specific surveys would have to be conducted prior to any additional ground disturbance as described in the exploration proposal, and measures would be taken to protect any rare and sensitive species found.

Additional access roads needed for development operations would reduce available forage, to some extent. The access roads would require continuation of coordination for moving livestock on and off the Forest, and for herding activities. There could also be increased hazards to livestock related to heavy vehicles travelling through grazing areas when cattle and sheep were present.

J. OUTDOOR RECREATION

During the scoping period one issue was identified pertaining to the effects of the proposed project on dispersed and developed recreation. This section discusses how each of the alternatives affects: a. Recreation Opportunity Settings, b. Recreation use, c. North Badger Creek as a potential river for classification under the Wild and Scenic River Act, and d. the Continental Divide National Scenic Trail.

Mitigation measures that would be needed to minimize the effects of any of the action alternatives are discussed where applicable.

Exploration Proposal

a. Recreation Opportunities

Three different Recreation Opportunity Settings would be affected by the proposed project. These settings are Rural (R), Roaded Natural (RN) and Semi-Primitive (SPM) (Map 3.11). These settings are defined in the ROS User's Guide (Forest Service, 1982) and were discussed in Chapter III. Man's activities such as US Highway 2, the Burlington Northern Railroad and Forest Service Roads and Trails currently have an influence on the character of this area.

Alternatives 1A, 1B, 2, 6A, 6B, 7A and 7B would result in a reduction of 2,176 acres of "semi-primitive" setting. These acres would be converted to a "roaded natural" setting.

Alternatives 8 and 9 would be so near the margins of the "semi-primitive" setting that there would be very little reduction in acres from semi-primitive to roaded natural setting.

b. Recreation Use

Recreation use that is likely to be affected by implementation of the proposed project may include camping, hiking, hunting, fishing, snowmobiling, cross country skiing, picnicking and off-road vehicle use. The effects on recreation activities are related to the changes in trail systems, developed sites and other dispersed sites of concentrated use, that may occur as a result of the proposed project activities.

Some effects on recreation activities would occur with each action alternative. The sights and sounds associated with exploration activities would detract from the natural setting and solitude sought by some recreationists (irrespective of season), and those recreationists would be displaced from areas they felt adversely affected their recreation experience. For example, trails crossed and displaced by roads and trail closures due to mitigation will directly affect trail users. Table 4.6 identifies the potential effects to these use areas by alternative. The effects are designated by actual physical displacement (D), project activity noticeable but no displacement (I), and no notice of project activity by users (N) that may be experienced by recreation users for the duration of project activity.

Table 4.6
Chevron Project
Effects On Outdoor Recreation

Alternatives	1A	1B	2	6A	6B	7A	7B	8	9	12**
TRAILS										
Whiterock Pass Corridor	N	N	D	N	N	N	N	N	I	N
Two Medicine Corridor	D	D	N	D	D	I	I	I	N	N
Continental Divide National Scenic Trail	D	I	N	D	I	D	I	I	N	N
ROADS										
Whiterock	N	N	D	N	N	N	N	N	I	N
Pike Creek	D	N	N	D	N	D	N	N	N	N
SUMMIT CAMPGROUND	I	N	N	I	N	I	N	I	N	N
US HIGHWAY 2 TRAILHEAD	I	I	N	I	I	I	I	I	N	N
SNOWMOBILING LOOP	D	D	D	D	D	D	D	D	N	N
MARIAS PASS SNOWMOBILE AREA	D	N	N	D	N	D	N	N	N	N
OUTFITTER CAMP	D	D	N	I	I	I	I	I	N	N
MOTORCYCLE/ATV	D	D	D	D	D	D	D	I	I	N

** no action

D = Direct effect. Would cause physical displacement
I = Indirect effect. Activity may be noticeable but would not cause physical displacement.
N = No effect. Sights and sounds of activity would not be noticeable to most users.

The following discussion summarizes the effects on trails, roads, Summit Campground, US Highway 2 Trailhead, snowmobiling loop and play area at Marias Pass, outfitter camps and motorcycle and ATV use as indicated in Table 4.6. Trails are discussed in terms of the South Fork Two Medicine Access Corridor and the Whiterock Pass access corridor.

For the roaded alternatives, trail users would be displaced from portions of trails during the road construction period. The amount of trail displaced and the trail number are detailed by alternative in Table 4.2 in Section IV.1.D-Access Management and Reclamation. Displacement from trails would occur for a period of approximately 1 year. Trail displacement may be mitigated by relocating trails. After completion of construction and trail use resumed, some trails crossing the access road and some overlap of trails with the access road may be unavoidable. Advance notice of trail closures during construction periods will be made available to the general public.

Trails along the South Fork Two Medicine access corridor would be impacted the greatest by implementation of *alternatives 1A and 1B* due to the number of miles of trails that would be displaced and the number of different trails affected. Much of this trail displacement would include portions of the Medicine-Elk Calf

Mountain National Recreation Trail. *Alternatives 7A and 7B* would have a moderate impact to the trails in the South Fork Two Medicine access corridor because of the number of trail crossings and the number of miles which the trails would be paralleled by the road. *Alternatives 6A and 6B* would have the least impact to trails in the South Fork Two Medicine access corridor because it would require only trail crossings and it lies above the river bottom where the primary access occurs.

Helicopter *alternatives 8 and 9* would have the least effect on trail users. There would be no physical alteration of the trail system, however, the noise associated with helicopters could be very distracting to users and disrupt their recreation experience. *Alternative 8* would probably have the greatest effect of the helicopter alternatives because more travel occurs along the trails in the South Fork Two Medicine corridor.

The Whiterock Pass access corridor gets much less trail use than the South Fork Two Medicine access corridor. Trails along the Whiterock Pass access corridor would be affected by only *alternatives 2 and 9*. *Alternative 2* would cause a moderate effect to the system because one mile of trail would be displaced and several crossings would be unavoidable. Effects on trail users by *alternative 9* would be similar to those discussed under *alternative 8*.

All of the roaded alternatives would displace some trails between Badger Cabin and the well site. These would include 2.5 miles of North Badger Trail 103 and 1 mile of Goat Mountain Trail 144. In addition, Trail 144 would be closed to *all* trail users between the North and South Forks of Badger Creek as wildlife mitigation (Chp.V.-Mitigation and Monitoring, Wildlife).

Mitigation measures for trails that may be included in an approved permit would be relocation of those miles of trail displaced by road construction (Chp.5-Mitigation and Monitoring, Outdoor Recreation; Tables 4.2 and 4.13). Relocation may also serve to avoid some of the trail crossings, however, some trails crossing the access road may be unavoidable. Advance notice of trail closures during construction periods will be made available to the general public.

Effects on roads are limited to the Whiterock Pass road and Pike Creek road near Summit Campground. The Whiterock Pass road would be directly affected by *alternative 2*. During reconstruction, new construction and drilling, the road would be closed to motorized access by the public. Motorized access would be managed according to the Lewis and Clark National Forest Travel Plan upon completion of the drilling. The Pike Creek road would be directly affected by *alternatives 1A, 6A and 7A* because the road would be closed to motorized travel during any reconstruction, new construction and drilling.

Summit Campground could be indirectly affected by *alternatives 1A, 6A, 7A, and 8* because project activity would be located about 1/4 mile away. The effects would be noise, dust and sights from project activity that would occur along the Pike Creek access road. This activity would be in addition to the activity that presently occurs from traffic and the Burlington Northern railroad along US Highway 2.

The trailhead along US Highway 2 could be indirectly affected by activity related to alternatives 1A, 1B, 6A, 6B, 7A, 7B, and 8 because of the sights and sounds associated with project activity.

Snowmobiling would be directly affected by the proposed activity. Alternatives 1A, 6A and 7A would cross through the snowmobile play area near the Pike Creek road. This could result in vehicle/snowmobile conflicts as well as the loss of area to snowmobilers that would be taken by the road right-of-way. The most significant impact to snowmobilers would be from Alternatives 1A and 1B along Trail 101 on the South Fork of the Two Medicine River. These alternatives would displace snowmobilers from a travel loop that traverses the South Fork of the Two Medicine River to Badger Cabin and then up North Badger Creek to the Continental Divide and onto the Flathead National Forest. These alternatives would displace much of Trail 101 and could prohibit snowmobiles from using the loop until drilling has been completed. This effect on snowmobile users may be mitigated by trail relocation.

At present, there are two licensed outfitter-guides that operate in RM-1 Unit. Potential impacts to their operations could be both direct and indirect. *Alternatives 6A, 6B, 7A, and 7B* would not be as disruptive as *alternatives 1A and 1B*, but their effect in the South Fork Two Medicine drainage would cause some outfitter-guides to find other areas to provide their clientele a remote backcountry experience. Obliteration of Trail 101 by *alternatives 1A or 1B* would be most disruptive to the outfitter-guides. An outfitter's base camp located along the South Fork Two Medicine River near Townsend Creek, could require relocation to avoid distraction during exploration activity. Mitigation that may be included in an approved APD is to relocate an affected outfitter operation to a mutually accepted location to accommodate existing service days.

Motorcycle and ATV use in the RM-1 Unit would be directly affected by all the *roaded alternatives* and could be indirectly affected by the *helicopter alternatives*. The direct effects include displacement from trails, crossings, and trail closures. Trail displacements would be those found in Table 4.2. The relative degree of effect from displacement and crossings on trail users would be as previously discussed under trails. Trail closures for wildlife mitigation would also affect motorized users (Chp.V-Mitigation and Monitoring, Wildlife). These closures are as follows:

Trail 103 from Badger Cabin to the Continental Divide - 7 miles.
Trail 141 Lee Creek - 4 miles.
Trail 142 Kipp Creek - 3 miles.
Trail 144 between its junction with trail 103 to its junction with the South Fork of Badger Creek - 5.5 miles.

These closures would apply to all alternatives throughout all phases of operation and would result in a total of 19.5 miles of trails unavailable for motorized use between July 15-April 1. This represents approximately 20% of the total miles of trail available to trail bikes and ATVs. For the period between April 2-July 14, these trails would be managed according to the Lewis and Clark National Forest Travel Plan (Forest Service, 1988). Thus the resulting availability of these trails for motorized use is as follows:

> Trail 103 will be available for trail bike and ATV use along the portion from Badger Cabin to its intersection with Trail 145 for the period July 1-July 14. This availability is significantly less than the current 5 months of availability under the Travel Plan. Trail 103 will be available for trail bike use from its junction with Trail 145 to the Continental Divide from April 2-July 14. This represents a 3 1/2 month period of availability as compared to 10 1/2 months of availability under the Travel Plan.
>
> Trails 141 and 142 are currently restricted from use by ATV's on a yearlong basis in the Travel Plan, thus the wildlife mitigation has no effect on ATV use in these areas. Use of Trails 141 and 142 by trail bikes will be from July 1-July 14. This availability is significantly less than the current 3 1/2 months of availability under the Travel Plan. A 3/4 mile portion of Trail 141 that lies just west of its junction with Trail 103 is available to ATV's and trailbikes for the period between July 1-July 14. This availability is significantly less than the current 5 months of availability under the Travel Plan.
>
> Trail 144 will be available to trail bikes from July 1-July 14. This availability is significantly less than the 3 1/2 months of availability under the Travel Plan. Trail 144 is currently restricted from use by ATV's on a yearlong basis, this wildlife mitigation has no effect on ATV users in this area.

Alternatives 1A, 1B, 6A, 6B, 7A, 7B and 8 would displace some hunters who camp in the Sawmill Flats area. Other hunters could consider the improved access to their advantage. Displacement under *alternative 8* would occur through the drilling phase. Displacement from Sawmill Flats under *alternatives 1A, 1B, 6A, 6B, 7A, and 7B* would continue until reclamation has been completed.

Alternatives 8 and 9 , would involve the least amount of direct impacts to recreation. No physical alterations would occur to trails or use areas. Helicopter flights from *alternative 9* would cross Trails 102, 103, and 144 with the potential to disrupt the recreation experience for some trail users.

Roaded *alternatives 1A, 1B, 6A, 6B, 7A, and 7B* would probably affect motorized and nonmotorized activities the most. Uninterrupted loop-type trip options would be severely limited during the time of drilling.

After completion of project activities, motorized opportunities could be enhanced if some accesses remained available for motorized recreationists.

If bridges remained in place, snowmobiling opportunities could actually be extended beyond the normal limitations of "snowbridge melt" in late winter. Motorcyclists may view any trail-to-road conversions as a loss of riding area.

Some nonmotorized recreationists activities would be displaced to the Bob Marshall and Great Bear Wilderness or Glacier National Park. Displacement could result in a lengthening of the distance and time needed to reach an area that has characteristics acceptable to nonmotorized recreationists.

Under *Alternative 12* (no action), no change would occur from the present situation.

c. Wild and Scenic River Study

North Badger Creek, an eligible river under the Wild and Scenic Rivers Act (1968), has been assigned a potential classification of "scenic" and is recognized for its outstandingly remarkable fisheries resource. This has been previously discussed in Chp. III.J-Outdoor Recreation.

All alternatives with exception of *Alternatives 8 and 9* would involve placement of a temporary bridge crossing on North Badger Creek between Lee and Kip Creek during the exploration phase. However, if production is established, then *alternatives 8 and 9* would require a road access which would also involve a temporary bridge crossing North Badger Creek.

Potential effects to North Badger Creek as a result of bridge placement and road construction are discussed specifically under Sections IV.1.B-Water Resources, IV.1.D-Access Management and Reclamation and IV.1.H-Fisheries. Management Standards that have been formulated to maintain the existing condition of North Badger Creek are found in the Wild and Scenic River Study, Amendment II, Lewis and Clark National Forest Plan, pgs. 2-77 to 2-79. Management standards that pertain to North Badger Creek under the scenic classification for Chevron's proposed actions are: mining, road construction, motorized travel and utilities. Mitigation measures outlined under Section IV.1.B-Water Resources and Chp.V-Mitigation and Monitoring and Management Guidelines in the Lewis and Clark National Forest Plan (forest Service, 1986a) would serve to minimize surface disturbance, sedimentation, pollution and visual impairment related to mining. Results of the cumulative sediment analysis discussed under Section IV.1.H-Fisheries indicate that a significant sedimentation event would have to occur to greatly affect the fisheries in North Badger Creek. Current views along North Badger Creek would be changed by construction of a road and bridge across the Creek. The impact of a new bridge across North Badger Creek and an access road would not affect the rivers' suitability for "scenic" classification for several reasons: 1) Only one bridge is proposed as a part of project activities and the effects of any construction are not expected to cause a significant reduction in the quality of the fisheries, 2) The access road would not parallel the river corridor and is expected to have only a limited effect on the visual resources along the river due to thick vegetation. Cumulative sediment analysis also indicates that road construction and use would not degrade the outstandingly remarkable fishery values.

d. Continental Divide National Scenic Trail

The Continental Divide National Scenic Trail extends from Glacier National Park into the southwestern portion of the RM-1 Unit. Alternatives 1A, 6A, and 7A would directly affect the Trail because the road proposed under these alternatives would share the same location for a distance of approximately 1.5 miles. This may negatively affect the recreation experience sought by some users of the Trail and could lead to their displacement to other areas. Alternatives 1B, 6B, 7B and 8 would indirectly affect the Continental Divide

National Scenic Trail from the noises and sights that would occur during project operations. Alternative 2 would impose the least effects on the Trail because activity would probably not be seen or hear by most trail users.

Reasonably Foreseeable Actions

A Dry Hole

The effects on recreation resources and activities for a second test hole would be similar to those discussed for the exploration proposal. The duration of activity in the area would be extended for a longer period of time.

A One Well Production

a. Recreation Opportunity Setting

The effects to the recreation opportunity setting would have occurred during drilling. With a roaded alternative, there would have been a reduction of 2,176 acres of semi-primitive setting to roaded natural appearing setting. Under a helicopter alternative, there would have been a very small reduction of semi-primitive setting acres to roaded natural setting acres. Some additional loss of semi-primitive setting acres could occur should a pipeline be needed. It is highly probable that any pipeline would be constructed alongside the access road for *all roaded alternatives*.

If the producing well had been drilled using either of helicopter *alternatives 8 or 9*, it would be necessary to construct an access road and possibly a pipeline to service the well site and transport the oil or gas. This road access would probably be similar to one of the roaded alternatives that is included herein.

b. Recreation Resources and Activities

The effects on the recreation resources and activities would be similar to those discussed for the exploration proposal. Pipeline construction activities would prolong the disturbance to recreationists and outfitters.

Should *alternatives 8 or 9* have been used, it would be necessary to construct an access road and possible a pipeline to service the well site and transport the products.

The level of activity associated with exploration would diminish with the start of production. The distractions of noise, dust and sightings of operations vehicles to recreationists should correspondingly decrease.

Motorized recreationists could experience enhanced opportunities, should the roads be open to use. The greatest opportunity would be with *alternatives 6A, 6B, 7A, or 7B*.

Non-motorized recreationists would continue to feel the effects as discussed for the exploration proposal.

c. Wild and Scenic River Study

The effects would be similar to those described for the exploration proposal. If a pipeline is needed to transport any hydrocarbon products, it would probably be located within the existing road right of way. The pipeline would be installed and monitored to ensure that surface disturbance, pollution, sedimentation and visual impairment are minimized.

A Field Production

Implementation of a producing field could result in a reduction of an additional 1,920 acres of "semi-primitive setting." These acres would be converted to a "roaded natural appearing" setting.

With additional activity that would occur in the field, most recreationists could be expected to use other portions of the RM-1 Unit, except for the snowmobilers. Snowmobilers could have a few additional miles of access for their use.

Recreationists seeking peace, solitude, and the challenge of the backcountry would be displaced to the Great Bear and Bob Marshall Wilderness areas or Glacier National Park.

Motorized activities could be enhanced if access remained open to use.

Snowmobiling could be enhanced, with roads and bridges remaining in place.

Outfitter-guides would be displaced to other locations for providing a remote backcountry experience. The development of additional trail heads from new roads could help alleviate some of the impact.

K. VISUAL RESOURCES (AESTHETICS)

This section discusses the effects on the visual resource, should the project be implemented. Four issues were identified during the scoping process. The four issues were: 1) Meeting visual quality objectives, 2) Effect on viewing from US Highway 2, private land, and Glacier National Park, 3) Changes in the existing visual condition, and the degree of change that will occur, and 4) Maintain the area without degradation of the existing natural condition. The effect of the proposed activity on the VQO are also discussed. Mitigation measures that may be implemented to maintain the desired visual condition are included where applicable and are included in Chapter V - Mitigation.

Portions of the project would be visible from various viewpoints. Five viewpoints (A, B, C, D, and F) were identified as "critical viewpoints" due their location and the vistas that exist from the viewpoint.

The following discussion describes how implementation of the various alternatives would affect views as seen from the primary viewpoints, which include: a) views from US Highway 2, b) views from Viewpoints C and D, c) views from the Two Medicine-Elk Calf National Recreation Trail, and d) view from the Autumn Creek Trail.

Viewpoint A was analyzed using computer generated Seen Area Map 3.12. Viewpoints B, C, D, and F were analyzed by cross-sectioning the area to develop Seen Area Maps 3.12, 3.13, and 3.14. Cross-sectioning was done without the benefit of tree screening. The actual seen area could vary from that shown on the maps, depending on the amount of tree cover and height of the trees. The maps show the maximum area that could be seen from the viewpoints. All viewpoints were located in clearings with grass as the major vegetation in the immediate area, thereby providing the widest viewing possible.

Exploration Proposal

a. Views from US Highway 2

Subtle viewing opportunities of roaded *alternatives 1A, 6A and 7A* may exist along US Highway 2, approximately one mile from Marias Pass. However, because these routes utilize the existing Pike Creek Road, the anticipated soil disturbance resulting from any road construction or reconstruction should be minimal. Additional viewing angles from the highway do not allow a good viewing opportunity of the proposed road. The road alignment is screened from view immediately after the junction with US Highway 2. These alternatives would be designed to comply with the Forest Plan Visual Quality Objectives of Partial Retention and Modification as described in Chapter III.K.

For *alternatives 1B, 6B, 7B and 8*, terrain features combined with the existing vegetation patterns would provide a screening of the intersection of the road with US Highway 2. Road construction at the junction with US Highway 2 would be located on relatively flat ground near the existing trailhead.

Visible construction impacts on moderately sloping ground near the intersection with US Highway 2 would result in the loss of some vegetation screening that now exists. Approximately the first one-quarter mile of road would be located within a Retention Visual Quality Objective zone. Visible road construction would not meet the Retention Visual Quality Objective. In a Retention Visual Quality Objective Zone, the natural appearance of the landscape is to remain dominant. When the Visual Quality Objective is not met, and the visual impact can be classified as EVC 4 (changes in the landscape easily noticed by the average person, and may attract attention) or greater, the site must be rehabilitated within two years after use to restore the landscape to EVC 3 or better (Lewis and Clark National Forest Plan, p. 3-27). The disturbance caused by road construction under these alternatives would be greater than EVC 4, and by road would have to be rehabilitated within two years after completion of drilling to meet EVC 3. With EVC 3, changes in the landscape would be noticed by the average person, but the changes should not attract attention. The natural appearance of the landscape would remain dominant. Visual definitions are included in Appendix I.

Alternative 2 accessing Whiterock Pass does not affect critical viewing areas. For this reason, points along this route were not chosen as viewpoints. This route is not visible from viewpoints on the Two Medicine-Elk Calf Mountain National Recreation Trail, from US Highway 2, or from the Autumn Creek Trail.

Alternative 9 would involve the least amount of direct impact to aesthetics. Any activity would be confined to landing zones and staging areas. As a consequence, little physical alternation would occur to most of the drainage. Proposed landing zones or staging areas would meet the Visual Quality Objective identified on Map 3.15.

b. Views from Critical Viewpoints C and D Near US Highway 2

The view from points C and D is a wide panorama of the Two Medicine Ridge. The South Fork Two Medicine River is below the line of sight due to topography and some vegetative screening south of the viewpoints. A small portion of the Continental Divide is visible between Elkcalf Mountain and Flattop Mountain. U.S. Highway 2 is visible in the foreground, but not at greater distances. The widest panorama occurs from Viewpoint C (Map 3.13).

From Viewpoint C, the low, relatively flat ridge immediately south of US Highway 2 is visible for much of its length. *Alternatives 1B, 6B, and 7B*, would cross the ridge approximately three miles west of the viewpoint. A lodgepole pine forested area would screen any disturbance.

A small section of seen area in the vicinity of Pike Creek, would be crossed by *alternatives 1A, 6A, and 7A*. The area should be screened by trees.

A section of area crossed by *alternatives 6A and 6B*, in the vicinity of Pike Creek would be viewed from Viewpoint C. Careful location of the access road and retention of trees should screen any activity from view.

The staging and landing areas for *alternative 8* would be on a low ridge approximately three miles west of Viewpoint C. Due to the rise in elevation and forested cover, the ground would not be visible. Helicopters flying in the area would be visible, but difficult to see when backdropped by the mountains.

Very little, if any, of the project area would be visible from Viewpoint D.

c. Views from Two Medicine-Elk Calf Mountain National Recreation Trail Critical Viewpoints A and B

Two primary viewpoints of the proposed project area have been identified along the Two Medicine-Elk Calf Mountain National Recreation Trail (NRT). Viewpoint "A" is near the southwest corner of Section 34 below Two-Medicine Ridge. Viewpoint "B" occurs in an opening in the vegetation along the trail near the top of Elk-Calf Mountain (Map 3.12). These views are discussed as follows:

From *Viewpoint "A" (viewing southwest to southeast)*, the vegetative or topographic screening would limit the seen area. The majority of all the alternatives and the well site would not be seen from this viewpoint.

A portion of *alternatives 6A and 6B* would be located within a Modification Visual Quality Objective zone. Due to the somewhat gentle terrain, care during location and construction of a road would help to meet the Visual Quality Objectives. The viewing position would be inferior to the seen area (at a lower elevation), thus the viewers would be looking up and over vegetation that should screen the area from view.

Alternatives 1A and 1B would essentially replace the Two Medicine-Elk Calf National Recreation Trail at the viewpoint. The view of these alternatives would be in the foreground zone. Implementation of these alternatives would result in a lessening of the visual quality and recreation experience for some users of the trail. Visual quality objectives would not be met for the first one-quarter mile of the alternatives. The site would have to be rehabilitated within two years to meet EVC 3.

Application of mitigation measures, such as minimum road widths and minimum clearing with revegetation of disturbed areas with grass seeding and planting of shrubs and trees, and color treatment of rock cuts, will help reduce contrasts caused by road construction.

Implementation of *alternatives 7A and 7B* would result in crossing the Two Medicine-Elk Calf Mountain NRT. Where this junction occurred, a reduction in visual quality could be expected. Mitigation techniques such as slope rounding, reseeding, and revegetating with shrubs and trees would help to minimize disturbances in the long term. Visual quality objectives would not be met for the first 1/4 mile of the alternatives. The site would have to be rehabilitated within two years to meet EVC 3.

Alternative 2 is not visible from the viewpoint.

For Alternatives 8 and 9,the proposed staging areas and helicopter landing areas would not be visible from the viewpoint.

The area seen from *Viewpoint "B" (viewing northwest to northeast)* would be Two Medicine Ridge portions of the flat ridge immediately south of US Highway 2, and the Pike Creek - Sawmill Flat area. The majority of all access alternatives and the proposed well site location would not be seen from this critical viewpoint. Scenic peaks and mountain ranges in Glacier National Park are the primary scenes from this viewpoint. Any other features, whether natural or man-made, would be secondary to views of the Park. The top of Goat Mountain would be visible. The well site would be located behind Goat Mountain, below the line of sight, and approximately eight miles away.

Portions of *alternatives 1B, 6B, and 7B* could be visible as the access road descends the low ridge on the north side of the South Fork Two Medicine River, to about the junction with alternatives 1A and 7A. Much of the slope is forested, and would tend to screen most of any access roads from sight. Not all of the access could be hidden, due to the superior viewing location of Viewpoint B.

An area crossed by *alternatives 1A, 1B, 6A, 6B, 7A, and 7B*, between the Two Medicine Ridge and US Highway 2 would be visible from Viewpoint B. Much of the area is forested, and care in location would help to reduce the visual effect. *Alternatives 7A and 7B* would have the potential for being the most visible for approximately the first four miles south of the South Fork Two Medicine River crossing at Sawmill Flat. Care in locating 7A and 7B would reduce the visual effect and help to meet the Visual Quality Objective.

The bridge crossing the South Fork Two Medicine River at Sawmill Flat and the access road would be visible. Because the area is relatively flat, the road width could be held to a minimum to reduce the visual effect.

d. Views from Autumn Creek Trail Critical Viewpoint F

Viewpoint F along the Autumn Creek Trail in Glacier National Park would be in a superior position to see great distances. The trail is over 260 feet higher than the RM-1 Unit along US Highway 2, and over two to three miles from the unit. Tops of the mountain ridges in the RM-1 Unit are visible from time to time. Vegetation along the trail, and within the RM-1 Unit should screen much of the area from view.

Portions of *Alternatives 1A, 1B, 6A, 6B, 7A, 7B, and 8*, could be visible from Viewpoint F. Terrain features, combined with vegetation patterns along the trail would help to screen out any activity in the project area. Mitigating measures, such as minimal clearing and revegetating by planting shrubs and trees would help to reduce the visual impacts.

There would be the potential to view portions of *alternatives 6A and 6B* along the west side of the South Fork Two Medicine River (approximately four miles of access would cross the seen area) (Map 3.14). Care in road location and minimal clearing would be necessary to keep any visual effects low.

There would be a potential to see the staging or landing area associated with *alternative 8*, dependent on where the actual staging area was located. Sites located on slopes facing the South Fork Medicine River would be less visible from Viewpoint F, but would increase the potential for viewing from Viewpoint B. Distance from either viewpoint would make any clearing appear to be smaller than actual size, and when revegetated would blend in with other clearings in the area.

e. *Alternative 12* (no action) would result in no man caused change, so there would be no effects. The area would remain in the existing condition.

As prescribed in Chapter V, reclamation work would be required following completion of roads and well sites. This mitigation requirement would ensure that revegetation and landscaping occurs consistent with Forest Plan requirements. A cumulative visual effect would be avoided. Revegetation would reduce visual impact along any road that would be used during the life of the project.

Table 4.7 compares the effect on visual quality objective for all the alternatives.

Table 4.7
Effects on Visual Quality Objective by Alternative

	1A	*1B*	*2*	*6A*	*6B*	*7A*	*7B*	*8*	*9*	*12*
Retention	M	-	M	M	-	M	-	M	M	M
Partial Retention	--*	--*	M	M	M	M	M	M	M	M
Modification	M	M	M	M	M	M	M	M	M	M

M = VQO maintained with no significant reduction anticipated.
- = Anticipated short term reduction in visual quality objective.
-- = Anticipated short and long term reduction in visual quality objective.

Reasonably Foreseeable Actions

A Dry Hole

Construction of another well near the proposed Chevron well site would not create any additional visual impacts when viewed from US Highway 2 or the major trails (Viewpoints A, B, C, D, F).

A One Well Production

For roaded *Alternatives 1A, 1B, 6A, 6B, 7A, and 7B*, effects would be similar to those discussed for the exploration proposal. It is likely that a production pipeline (if installed to exit at US Highway 2) would be constructed in the same right-of-way issued for the proposed road. Very little additional disturbance would occur.

For *alternatives 8 or 9*, an access road and pipeline would have to be constructed. Effects would be similar to any of the road alternatives discussed for the exploration proposal.

Production facilities associated with development along the route of *Alternative 2* would not be visible from any of the major viewpoints, US Highway 2 or the Two Medicine-Elk Calf Mountain National Recreation Trail.

A Field Production

A field development in the vicinity of the proposed Chevron well would not be visible from US Highway 2, or from major trails in and adjacent to the RM-1 Unit, (Viewpoints A, B, C, D, F).

All roaded alternatives would have effects similar to those discussed for the exploration proposal. As the field is developed, some additional visual effects may occur, depending on where additional wells and roads were located and the visual point of reference.

For *alternatives 8 and 9*, the effects would be similar to the roaded alternatives discussed for the exploration proposal.

L. CULTURAL VALUES

Three issues were expressed regarding cultural values during the scoping process: 1) effect of the proposed project on American Indian religious freedom rights, 2) agency responsibilities and compliance efforts with the American Indian Religious Freedom Act of 1978 (AIRFA) and protection of religious rights, and 3) effect of the proposed project on archaeological (cultural) resources that could be present.

Exploration Proposal

The following discussion describes how implementation of the various project alternatives could affect traditional Blackfeet culture, religious practices, and spiritual values. Also described is the effect the alternatives could have on archaeological resources.

a. Blackfeet Indian Traditional Culture and Religion

Blackfeet traditionalists view all phases of the proposed project as a negative impact on their culture and practice of religion. Some traditionalists believe hat the project would actually "drive the spirits away." The practice of traditional Blackfeet culture and religion would receive both direct and indirect effects from *all action alternatives*.

Direct effects, for all action alternatives, would include visual, auditory, and physical changes. A drill rig or pump may be regarded as out of character with the area, and therefore visually undesirable. The introduction of noise, caused by drilling and vehicle travel, would disrupt the quiet and "peacefulness" deemed necessary for some religious pursuits. There would be a possibility of intrusions upon solitude. These effects are discussed in detail in Section IV.1.F-Badger-Two Medicine Roadless Area. Physical changes would occur as a result of road building or helicopter activity. Vision quests or other types of praying could be affected. Religious sweatbaths, called "sweats," and sun dances may not necessarily be affected, as these can occur virtually any place that has been designated. These have been observed occurring near highways and active railroad lines.

Most concerns expressed by traditionalists are regarded as indirect effects. Blackfeet traditionalists see a need for some lands to remain undeveloped for future generations. They view the RM-1 Unit as "a last stronghold for pristine conditions." Many believe the proposed exploration would destroy these conditions. They see other areas which are traditionally considered spiritual, such as Chief Mountain in Glacier National Park, as having received too much disruption. In the past, traditionalists fasting and praying in Glacier Park have been interrupted by curious tourists. The Sweet Grass Hills in northwestern Montana, another traditionally significant area, are already undergoing some mineral exploration, against the wishes of the traditionalists.

The Blackfeet are also concerned about the character of the RM-1 Unit changing because of the renewed interest that members are taking in the traditional ways. As discussed in the Chp.III.L, an increasing number of Blackfeet are participating in traditional practices. People recovering from drug and alcohol dependencies are encouraged to receive support through the practice of traditional beliefs. Again, there is a concern that other locales will not be available or suitable for this purpose, and so the RM-1 Unit has gained significance.

During the *exploration phase*, vision questing on Goat Mountain would not be possible. However, there are many other mountain peaks in the area which afford similar settings as Goat Mountain, and which would not be impacted by exploration. No other specific activities or locations are known that may be affected by Chevron's exploration proposal.

The *single well* or *field production* phase would be less impacting than the exploration phase. The production phase would involve much less human activity and less noise. Production may also be less visually impacting because fewer vehicles would be on roads and at the well site and wellhead equipment would have a shorter stature than the drill rig. Additional facilities for separation and pipeline, however, would add to the visual impact. There would be a need to continue to work with the traditionalists, and keep them informed of the project status.

Alternatives 8 and 9 are regarded as minimally impacting. One traditionalist (who has stated that he underwent a vision quest up on top of Goat Mountain) conceded that he viewed *alternative 9* as being the least damaging of all action alternatives. It seems, however, that the noise from the helicopters could be disruptive and annoying, unless the drilling activity and religious activities were scheduled apart from each other.

It appears that *alternative 2* could be the least impacting to traditionalists because this activity is associated primarily with an existing road (although reconstruction of the road would be undertaken). Any "damage" to the spirits would presumably have occurred when the road was originally built. Access would continue to be restricted as it is at present. Vehicle traffic would seem to cause less noise than the helicopter.

Effects caused by *alternatives 1A, 1B, 6A, 6B, 7A, and 7B* would be similar to each other. Road construction activities and travel would cause changes to the physical environment and increase noise levels. Traditionalists have a concern that people could stop their vehicles and investigate activities or actual sites from newly constructed roads. Significant ground disturbance would result from *alternatives 6A, 6B, 7A, 7B.*

Alternative 12 (no action) would cause no visual, auditory or physical changes from the existing condition, and so would apparently have no effect on religious practices.

b. Agency Responsibilities and Compliance with the American Indian Religious Freedom Act and Protection of Religious Rights in Accordance with the First Amendment

The Lewis and Clark Forest began working with the Blackfeet Tribe and traditionalists regarding land management and cultural concerns prior to receiving Chevron's APD. A "General Working Group" was established by the Tribe to address cultural issues: membership included tribally recognized cultural/religious leaders and interested persons. Attendance at these meetings was open to anyone (see Chapter III.L.b for further description of participants and meeting formats). In addition, a number of the people who are traditionalists and/or have cultural concerns participated in the Social Assessment for this EIS. Understanding of the cultural and religious concerns was further enhanced through the ethnological/ethnohistoric overview prepared by Deaver (1988), which is hereby incorporated by reference, and summarized in Appendix M.

While the traditionalists have identified general concerns regarding disturbance to cultural values in the RM-1 Unit, they have been reluctant to discuss any specific potential effects caused by oil and gas exploration to the practice and belief in their traditional religion. The Forest Service has been willing to discuss specific impacts for consideration in selecting a preferred alternative and mitigation such as those proposed by Deaver (Appendix M). The Forest has provided and continues to provide opportunity for this type of input. Also, specific information would allow the development of specific mitigation measures.

The report by Deaver (1988) proposes some possible mitigation measures, similar to measures which have been developed and implemented by other Montana Indian groups. These mitigation measures include, total avoidance of significant areas, offering atonement for the spirits, and cooperative scheduling. These measures require consultation with tribal elders and/or practitioners. Deaver (1988) also suggests that an activity schedule be published in the local newspaper so that individuals could practice their own private and personal mitigation. These proposals, however, are not regarded as viable at this time as Blackfeet traditionalists have state that they categorically oppose the Chevron and Fina projects and see no methods of mitigation.

The Lewis and Clark Forest views AIRFA compliance as an on-going process. The Forest will continue consultation with the Blackfeet tribe and traditionalists about implementation of any plans or projects. Direction for cultural consultation is presented in the Lewis and Clark National Forest Plan (Forest Service, 1986a). This direction was co-authored by Blackfeet people.

c. Archaeological Resources

Archaeological resources could be affected as a result of both direct and indirect impacts. Direct effects involve the disturbance of a buried archaeological deposit. This could possibly happen during road or well pad construction. Indirect effects could result from an increased number of people stopping to look at an archaeological site and possibly removing artifacts. If a site is encountered during any phase of the project, particularly construction, the Forest Service would conform to procedures as established in the National Historic Preservation Act (1966) and applicable Federal regulations (36 CFR 800) would be used. This includes road relocation within the studied corridor.

All road alternatives and the drillsite area have received intensive archaeological survey, except for *alternatives 6A and 6B* from the point beyond their junction. The northeast and southwest portions of *alternatives 7A and 7B* were surveyed. Surveys were conducted by a consulting company under contract to Chevron and also by the Lewis and Clark National Forest archaeologist. Blackfeet traditionalists accompanied the consulting company.

A number of cultural (archaeological) sites were identified in the overall area of the roaded alternatives. None would receive any direct or indirect impacts. Road construction or an increase in the number of people in the area would not affect these sites because they are away from areas to be directly impacted. One site (Roosevelt Memorial Monument at Marias Pass) has been determined to be eligible for listing on the National Register of Historic Places. Two sites may be eligible (Badger Guard Station and a prehistoric lithic scatter).

Alternatives 8 and 9 would be minimally impacting, involving disturbance in only the staging area and wellsite. If an archaeological site was encountered, mitigation would be relatively simple; the staging area could be moved.

Alternative 2 would primarily involve road reconstruction, with some new construction. It is doubtful that this would occur in any area where archaeological resources would be present in an undisturbed state. The road would be located primarily on a side slope with better locations for campsites being located nearby.

Alternative 1A and 1B would involve some road reconstruction, initial disturbance has already occurred. This trail/road receives considerable use. It appears to possess a moderate or moderately high potential for archaeological resources. However, prehistoric travel down the river corridor may have occurred up on a side slope to avoid dense vegetation, wet grounds, and river crossings. Although no archaeological sites were found along these alternative corridors, there is a reasonable chance that archaeological resources could be encountered during road construction.

Alternatives 6A, 6B, 7A, 7B would involve major disturbance and thus have a moderate potential for impacting archaeological sites. No sites are recorded along any of these alternatives. If the river bottom was too heavily vegetated for prehistoric travel, a trail could have been developed along one of the side slopes. No trails are known on either of these slopes. There is a reasonable chance that archaeological resources could be encountered during road construction.

Reasonably Foreseeable Actions

A Dry Hole

a. Blackfeet Indian Traditional Culture and Religion

Drilling additional exploratory wells, should the first one prove dry, should not create any additional effects other than extending the amount of time of visual effects, noise, and other increased activity.

b. Archaeological Resources

Drilling another exploratory hole should pose little risk to archaeological resources. If the second hole was drilled away from the first, it would still probably be within the area surveyed prior to exploration, and may not even necessitate an additional archaeological inventory. In the event the site is in an area that has not been surveyed, an archeological survey would be conducted prior to any ground disturbance.

A One Well or Field Production

a. Blackfeet Indian Traditional Culture and Religion

Activities which occur during production would be less impacting than those taking place during exploration. The production phase would involve much less human activity and less noise. The drillsite would probably be monitored once per day by one individual. Specific monitoring procedures would be determined in the production analysis. Also, production equipment would be less visually impacting as it is generally smaller. This equipment is also less noisy. Production plans would have to be approved in another decision document and mitigation would be developed.

b. Archaeological Resources

Wellsite production facilities would most likely be located within the area which has received previous archaeological inventory. Additional archaeological inventory may be deemed necessary prior to construction of the well(s) and associated land disturbance. Archaeological inventory of potential pipeline corridors would be required prior to any finalization of pipeline plans. It is most likely that any pipeline would be constructed in a road right of way that has already been surveyed. If a pumping station or any other production facilities were determined necessary, an archaeological inventory would be required.

Specific archaeological requirements would be met prior to making decisions in the production analysis.

M. BLACKFEET RESERVED RIGHTS

The issues expressed by the public were the effects on: 1) Blackfeet hunting and fishing rights, 2) Blackfeet timber rights, and 3) Blackfeet rights to access the RM-1 Unit, or the closure or reclaiming of roads providing access to the proposed well site.

The basis of the present use rights accorded the Blackfeet Indians concerning the RM-1 Unit of the Lewis and Clark National Forest is the Blackfeet Agreement of 1896. The content of this Agreement has been presented in Chapter III. The purpose of this section is to discuss aspects of this Agreement in the context of the alternatives being considered for this environmental impact statement and the specific issues identified in the scoping analysis. Mitigation measures that would be needed to minimize the effects are discussed for each scenario.

Exploration Proposal

a. Blackfeet Hunting and Fishing Rights

None of the alternatives would alter the Blackfeet Tribe's right to hunt or fish, as reserved under Article I of the 1896 Agreement. This agreement states that Blackfeet hunting and fishing rights within the ceded lands were reserved in accordance with the provisions of the game and fish laws of the State-of-Montana. The State of Montana's statute concerning hunting and fishing had been enacted in 1895. The Forest Service administers its lands in accordance with the Montana game and fish laws.

b. Blackfeet Timber Rights

None of the alternatives would alter the Blackfeet Tribe's right to utilize timber, as reserved under Article I of the 1896 Agreement. It is the Forest Service position that the Tribe's exclusive timber rights on the ceded lands were diminished by the 1896 Agreement, to a right to gather wood for agency and school purposes, and for their personal uses for houses, fences, and all other domestic purposes. While there is some disagreement between the Tribe and the Forest Service on whether commercial use was contemplated by the Blackfeet or the Government, when the 1896 Agreement was written, this is not a subject of concern for this analysis.

c. Blackfeet Access Rights

None of the alternatives would alter the Blackfeet Tribe's right to go upon any of the lands within the RM-1 Unit. The following table is an analysis of the Blackfeet access rights. The various forms of access are given with the effects on that access by any of the proposed alternatives.

Form of access	*Effects due to proposed alternatives*
1. Pedestrian	None of the proposed alternatives would restrict pedestrian access by the Blackfeet to the RM-1 Unit.
2. Equestrian	None of the proposed alternatives would restrict equestrian access by the Blackfeet to the RM-1 Unit.
3. Motorized	Motorized access in the RM-1 Unit would be in accordance with the 1988 Lewis and Clark National Forest Travel Plan. Exceptions to this are the trails that are identified for restricted use in the Biological Evaluation (see Chp.V.A.-Wildlife, items 12. and 13.).

The public, as well as members of the Blackfeet Tribe would be required to observe any access road restrictions or road closures that could be placed into effect as a mitigation measure, and in compliance with the Forest Plan management directions.

It is the position of the Blackfeet Tribe, that the Forest Service, absent Tribal consent, lacks legal authority to enforce road closures against Tribal members (Santana, 1987). An examination of the laws indicates, the United States would have the right to restrict or prohibit motorized use on any project road, when a closure was determined necessary for protection of threatened and endangered species, and would not abrogate nor impermissibly impact the rights reserved by the Tribe under the 1896 Agreement (Appendix J). Such restrictions, in this instance, would be designed specifically to prohibit entry of motorized vehicles. The Blackfeet could continue their historical access to the area.

Before access restrictions would be implemented, the Forest Service has agreed to provide sufficient public notice, including direct notice to the Blackfeet Tribal Business Council, as to the location of the restricted access points along any road. The intent of this action is to give adequate notice to the public and Tribal members of the extent of access restriction that the Forest Service considers to be necessary.

Alternatives 1A, 1B, 2, 6A, 6B, 7A and 7B would require that an access road be constructed (or reconstructed) to provide vehicle access to the proposed well site. This access road would be managed according to requirements, the Lewis and Clark National Forest Land Management Plan, 1986, the Forest Travel Plan, and any mitigation measures required to reduce effects on National Forest resources.

Alternative 2. Restrictions are currently in effect on the Palookaville Road (FS Road No. 9218). The road is closed to all vehicles, except snowmobiles, from the Forest Boundary to the Badger Guard Station, from December 1 to June 30 to protect Grizzly bear spring range. Except when authorized, the road from Whiterock Pass to the Badger Guard Station is closed to motorized vehicles.

Under *Alternative 12* (no action), the existing conditions would remain unchanged, and there would be no effect.

Reasonably Foreseeable Actions

A Dry Hole

The effects would be similar to that expressed for the exploration proposal. The major effect would be that the proposed activity and any restrictions would continue for a longer period of time.

A One Well Production

Any effect to the Blackfeet hunting and fishing rights, timber rights, and access rights would be similar to those discussed for the exploration proposal but would continue throughout the life of the well. Additional mitigation measures may be enacted during the production phase for the protection of Threatened and Endangered species.

A Field Production

Any effect to the Blackfeet hunting and fishing rights, timber rights, and access rights would be similar to those discussed for the exploration proposal and one well field and would continue throughout the life of the field.

N. SOCIOECONOMICS

This section discusses the economic and social consequences associated with the proposed project. Five general areas of concern were identified during the public scoping process: 1) Costs to the local communities for public services will far outweigh any benefits derived from employment and income during oil and gas exploration, 2) Displacement or change in the economic base now derived from tourism, as a result of oil and gas exploration, 3) Delays or denial of the permit will diminish an important economic benefit to the State and the local communities, such as taxes for public services, 4.) Consideration of effects that an increased number of people could have upon visual aesthetics and quality of life attributes be included in the analysis, along with the social impacts to the local communities, and, 5) Consideration of effects that an increase in the number of people, and the associated activity, would have upon the present "quality of life" in the area.

The economic effects (concerns 1,2 and 3) are discussed in the first section, and the social effects (concerns 4 and 5) are discussed in the second section.

1. Economic Conditions

The economic issues are discussed in this section in terms of: 1) employment opportunities and the associated personal earnings, 2) changes in business activity and the local tax base, and 3) additional public service requirements.

Exploration Proposal

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a. Employment

Exploratory drilling of the Chevron well site would provide short-term employment opportunities (1 to 3 years). Employment would be concentrated in the mining, construction, and transportation sectors of the economy. About 30 full-time workers would be associated directly with drilling operations. Local expenditures for goods and services could range from $2.6 million for helicopter access to $3.5 million for roaded access. Local expenditures would depend upon the availability of oil and gas support services in the area and actual surface and subsurface conditions encountered while drilling. These expenditures could result in $4.4 million to $6.1

million in business activity for the regional area (Glacier, Toole, Pondera, Teton and Cascade Counties). This business activity could support 75 to 120 short-term jobs in construction, transportation, oil/gas services, and retail trade.

Many of the job opportunities would be provided by existing services and taken by local residents.

With the *roaded alternatives*, the greatest change would be an estimated 30 jobs located at the drill site, with another 120 short-term jobs in construction, transportation, oil/gas services, and retail trade.

With *helicopter alternatives 8 and 9*, the greatest impact would occur from an estimated 30 jobs located at the drill site with another 75 short-term jobs in support services. Table 4.8 shows an estimate of the exploration costs, local expenditures, business activity, employment, and personal earnings associated with exploration.

Table 4.8
Estimates Of Exploration Costs, Local Expenditures, Business Activity, Employment And Earnings With Exploration Of The Chevron Well (thousands of dollars)

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	Roaded Access Alts. 1A, 1B, 2, 6A, 6B, 7A, and 7B	Helicopter Access Alts. 8 and 9	No Action Alt. 12
Exploration Costs	$9,200 - $9,400	$15,500	0
Local Expenditures	$3,500	$ 2,600	0
Business Activity	$6,100	$4,400	0
Employment			
On Site Workers	30	30	0
Other	120	75	0
Total	150	105	0
Earnings	$2,700	$ 2,000	0

With *Alternatives 1A, 1B, 6A, 6B, 7A, 7B, and 8*, employment impacts related to exploration would occur primarily in the community of East Glacier Park, with minor impacts to Browning, Cut Bank, and Great Falls in terms of increased numbers employed, and the settlement pattern of non-local temporary workers. The number of workers residing in East Glacier Park would depend on whether a camp is available at the well site for the drill rig crew. Employment would occur during the drilling operation, when 2 (with a crew camp) to 30 (without a crew camp) full-time and temporary workers could reside in East Glacier Park, while another 7 to 11 jobs would be in the construction, transportation, oil/gas services, and retail trade and probably taken by local residents. Mitigation measures for wildlife indicate that a crew camp would not be an option (Chp.V-Mitigation and Monitoring).

With *Alternatives 2 and 9*, employment impacts would occur primarily in the communities of East Glacier Park and Browning, with minor impacts to Heart Butte, Cut Bank, and Great Falls in terms of increased numbers employed as well as the settlement patterns of non-local temporary workers. The number of workers residing in East Glacier Park and Browning would depend on whether a camp at the well site was available for the drill rig crew. This employment would occur during the drilling operation when about 2 to 5 full-time temporary workers could reside in East Glacier Park, and 2 to 25 workers could reside in Browning. Another 10 to 16 jobs would be in the construction, transportation, oil/gas services, and retail trade, and probably taken by local residents in East Glacier Park and Browning.

Other exploration jobs in construction, transportation and oil/gas services could be expected to occur in Glacier, Toole, Teton, Pondera, and Cascade counties. Increases in construction employment as well as increases in various service sectors would account for the main employment effects. While there would be some effect on employment in the short-term, this activity would benefit the existing oil and gas service sector and not create many new jobs. Any new jobs associated with exploration would probably be taken by local residents.

b. Population

Under *Alternatives 1A, 1B, 6A, 6B, 7A, 7B, and 8*, exploration would result in short-term impacts to the community of East Glacier Park as the result of population growth associated with temporary non-local workers. The population of East Glacier Park could increase by 1 percent (with a crew camp), to 8 percent (without a crew camp), assuming workers would not be accompanied by their families.

With *Alternatives 2 and 9*, exploration would result in short-term impacts to the communities of East Glacier Park and Browning. The population of East Glacier Park could increase by 1 percent, and the population of Browning could increase by 0 to 4 percent (with and without a crew camp).

Exploration involves relatively few personnel, and employees are often single or unaccompanied by dependents, reside in transient facilities, and eat in local restaurants. With no significant long-term population increases, there would be no community service impacts (e.g., water, sewage, schools) or impacts from traffic or law enforcement problems that would be project related.

c. Personal Earnings

For *All alternatives* (except no-action), there would be less than a one percent increase in earnings, for the local area. The communities in which the workers and their families reside would experience some increases in economic activity as a result of employees' payroll expenditure and company expenditures for goods and services.

d. Housing

The single most significant potential impact expected to occur, is the temporary demand for housing during the drilling timeframe (1-3 years, depending on the alternative selected). To a large extent, the non-local's choice of housing would reflect the short duration of well drilling. Exploration related workers generally prefer apartments, mobile homes, or recreational vehicles. Most of these workers seek lodging as close to the work site area as possible, or within the current boundaries of, or adjacent to, incorporated towns. This reflects the service, trade, housing supply, and governmental infrastructure presently available. This would place a heavy demand on the local housing supply, especially motels and trailer/RV parks/campgrounds.

Under *Alternatives 1A, 1B, 6A, 6B, 7A, 7B, and 8*, about 2 to 30 temporary housing units could be required in East Glacier Park. This would depend upon whether a crew camp at the well site is available for the drill rig crew. A temporary housing demand could displace tourists looking for accommodations during the summer months.

With *Alternatives 2 and 9*, about 2 to 5 housing units could be required in East Glacier Park and 2 to 25 units in Browning. Actual occupancy could vary, depending upon the family status of temporary workers. If workers are accompanied by their families, the demand for mobile homes and/or apartments may increase.

e. Public Finance

All action alternatives would provide for exploration and possibly for eventual production of oil and/or gas. Production would increase the tax base and provide revenues to the State and Pondera County.

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f. Alternative 12 (no action) would cause no change, so there would be no effects.

Reasonably Foreseeable Actions

A Dry Hole

Exploration drilling of another well at the Chevron site would continue to provide employment opportunities but to a lesser degree than the first dry hole. About 30 full-time workers would be associated with drilling operations.

Local expenditures for goods and services are estimated at $1.6 million for helicopter access, and $1.3 million for roaded access. This is considerably less than drilling the first well, as existing roads could be used. Approximately 27 to 32 short-term jobs could occur in construction, transportation, oil/gas services, and retail trade, in Glacier, Toole, Teton, Pondera, and Cascade Counties. This activity would continue to benefit the existing oil and gas service sector and not provide many new jobs. Table 4.9 shows an estimate of the exploration costs, local expenditures, business activity, employment and earnings associated with drilling a second well.

Table 4.9
Estimates Of Exploration Costs, Local Expenditures, Business Activity, Employment And Earnings With Drilling A Second Well At The Chevron Site (thousands of dollars)

	Roaded Access Alts. 1A, 1B, 2, 6A, 6B, 7A, and 7B	Helicopter Access Alts. 8 and 9	No Action Alt. 12
Exploration Costs	$6,600	$14,200	0
Local Expenditures	$1,300	$ 1,600	0
Business Activity	$2,100	$2,500	0
Employment			
On Site Workers	30	30	0
Other	27	32	0
Total	57	62	0
Earnings	$1,300	$ 1,400	0

Drilling a second well could result in short-term changes in employment, population, and housing demand, primarily in East Glacier Park and/or Browning. These impacts would depend upon whether a crew camp was available at the well site. Impacts would be similar to those described in the discussion for the exploration proposal, but would extend the impacts over a longer period of time. The first and second wells would be drilled in sequence over a period of approximately 3 to 5 years.

A One Well Production

Employment effects would be expected to occur primarily in Glacier, Toole, Teton, Pondera, and Cascade Counties during road, pipeline, and production facilities construction. The greatest impact would occur with an estimated 70 to 120 workers related to development for the period of time needed to bring the wells into production (6 to 12 months). After production facilities were developed, only a few workers would be associated with maintenance.

While there would be some effect on employment in the short- and long-term, this activity would benefit the existing oil and gas service, retail trade, and service sectors and not provide many new jobs. Any new jobs provided by production would probably be taken by local residents. Table 4.10 shows an estimate of the production costs, local expenditures, business activity, employment and personal earnings associated with producing a single well.

Table 4.10
Estimates Of Production Costs, Local Expenditures, Business Activity, Employment And Earnings Associated With A Producing Well (thousands of dollars)

	Roaded Access Alts. 1A, 1B, 2, 6A, 6B, 7A, and 7B	Helicopter Access Alts. 8 and 9	No Action Alt. 12
Production Costs	$2,100 - $3,200	$3,400	0
Local Expenditures	$2,100 - $3,200	$3,400	0
Business Activity	$3,600 - $5,700	$5,900	0
Earnings	$1,000 - $1,700	$1,800	0
Employment	70 - 116	120	

Population increases related to production would be short-term and spread out over a large area. This would occur primarily in Cut Bank, Conrad, Shelby, and Great Falls, where most of the oil and gas service related businesses are located.

There would be less than a one percent increase in personal earnings during this phase. The local communities in which the workers and their families reside would experience some increase in economic activity as a result of employees' payroll expenditure and company expenditures for goods and services.

Maintenance of the well would require only a few workers. More permanent housing would be needed, however, these personnel may be local residents.

One effect to the local economy from oil or gas production would be additional public revenues. Tax revenue from production would increase, benefiting Pondera County and the State. Federal mineral receipts would increase and are distributed as follows: 50 percent to the State Treasurer, 40 percent to the Reclamation Fund, and 10 percent to the U.S. Treasury. Montana would gain income with production. Figure 4.11 shows the royalties and taxes for each dollar of natural gas production and the distribution of those monies.

A Field Production

Field development would result in employment opportunities associate with additional road construction, pipelines and facilities, and drilling additional wells. Employment during road, pipeline, and production facilities construction would be an estimated 70 to 120 workers. Each additional well drilled would require 30 workers associated with drilling operations, and another 27 to 32 short-term jobs in construction, transportation, oil/gas services, and retail trade.

Field development related jobs would occur primarily in Glacier, Toole, Teton, Pondera, and Cascade Counties, where most of the oil and gas service related businesses are located. While there would be some effect on employment in the short- and long-term, this activity would benefit the existing oil and gas service, retail trade, and service sectors and not provide many new jobs. New jobs provided by field development would probably be taken by local residents. Table 4.11 shows an estimate of the development costs, local expenditures, business activity, employment and personal earnings associated with production facilities.

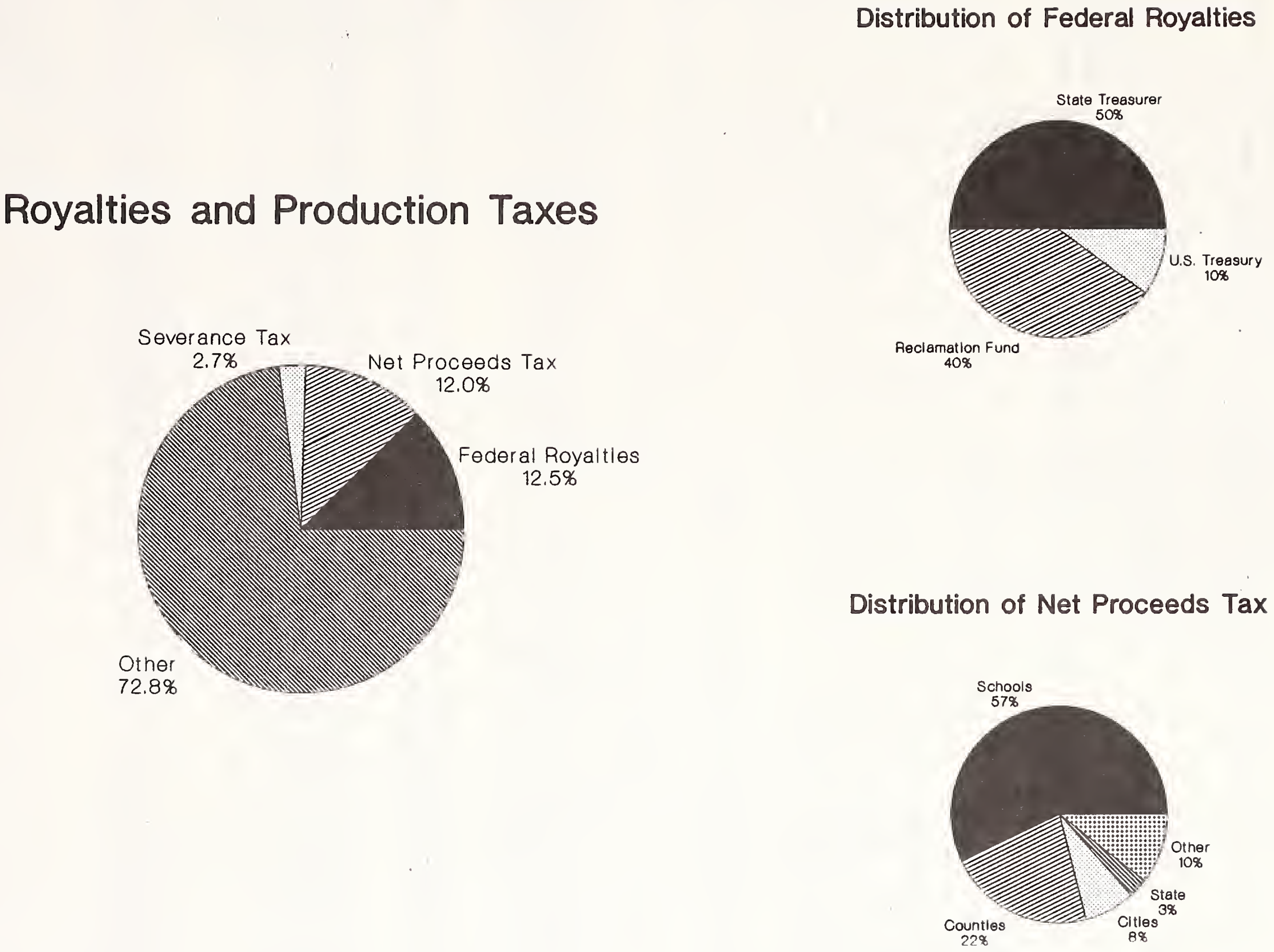


FIGURE 4.11 - Royalties and Production Taxes for Each Dollar of Natural Gas Produced and the Distribution of those Revenues

Table 4.11
Estimates Of Field Development Costs, Local Expenditures, Business Activity, Employment and Earnings With Production Facilities And Drilling An Additional Well
(thousands of dollars)

	Roaded Access Alts. 1A, 1B, 2, 6A, 6B, 7A, and 7B	Helicopter Access Alts. 8 and 9	No Action Alt. 12
Development Costs	$8,700 - $9,800	$17,600	0
Local Expenditures	$3,400 - $4,500	$ 5,000	0
Business Activity	$5,700 - $7,800	$8,400	0
Employment			
On Site Workers	30	30	0
Other	97 to 27	152	0
Total	127 to 177	182	0
Earnings	$2,300 - $3,000	$3,200	0

Effects to population would be similar to those described for the exploration proposal, and the one well production, with impacts for a much longer duration.

Effects on personal earnings would be similar to those described in the discussion for the exploration proposal and the one well, with impacts for a much longer duration.

Drilling additional wells would result in short-term changes in employment, population, and housing demand primarily in East Glacier Park and/or Browning. These impacts would depend upon whether crew camps were available at the wellsites. Effects would be similar to those described for the exploration proposal, with impacts for a much longer duration.

Effects on housing would be similar to those described in the discussion for the exploration proposal and the one well, with impacts for a much longer duration.

The effect of additional public revenues would be similar to those discussed for the one well production, with benefits to Pondera County and the State. Figure 4.11 shows the royalties and taxes for each dollar of gas production that could occur, and the distribution of those monies.

2. Social Conditions

This portion of the socioeconomic section describes the effects of oil and gas development on the communities surrounding the RM-1 Unit and the people who utilize the National Forest System lands. Specifically addressed are the effects on the following: 1) Lifestyles, 2) Attitudes, Beliefs and Values, and 3) Social Organization.

The Lifestyles discussion includes direct and indirect economic relationships to the communities and their aesthetic ties to the land. The attitudes, beliefs, and values section addresses the feelings, preferences, and expectations that the communities have for management and use of the lands. The social organization section refers to effects on the cohesion, stability or social institutions now existing in the communities. These three variables have been selected because they would show the most important social changes likely to occur under each alternative. Additional information on social impact analysis is found in the report on Social Effects, Perceptions, and Attitudes of the Chevron Exploration Well Proposal (Hamlett and others, 1987).

Rigjobs would be company
LIST JOB TYPES

Exploration Proposal

a. Lifestyles

The economic gains for any of the communities surrounding the National Forest lands would be short term. The economic analysis indicates that 30 full-time workers would be associated directly with the drilling operations and an additional 75-120 short-term jobs in construction, transportation, oil/gas services and retail trade. The exact number of jobs that could become available is dependent on the alternative selected and the conditions encountered during drilling. Most of these jobs would be absorbed by the local communities (Cut Bank, Great Falls, and Shelby) already supporting these types of services.

Because *Alternatives 1A, 1B, 6A, 6B, 7A, 7B* enter the RM-1 Unit from US Highway 2, the limited number of local jobs would most likely be filled by residents of the East Glacier Park and Browning communities. Unemployment has not been a major problem for East Glacier Park, as many residents are professionals who commute to Browning for employment. Some of the jobs would be filled by tribal members from the Browning and Blackfeet Reservation area. New employment opportunities would benefit the reservation (where unemployment rates are highest). These benefits would be relatively short-term and benefit only a small percentage of the total Blackfeet population. It should be noted that the perception in the Browning area, where unemployment is a Tribal concern, is that any mineral activity would greatly improve the economic, and employment situation for the Tribe.

Because oil and gas-related businesses are established in Cut Bank, any of the action alternatives could result in a slight increase in business trade. The existing business sector would benefit.

Alternative 2. Although this access route would pass near the town of Heart Butte, it would probably not improve the economic situation of the community. Very few businesses exist in Heart Butte, and employment figures based on the economic analysis indicate that most of the temporary workers would reside in East Glacier Park and Browning. A gas station/convenience store along the main arterial route through Heart Butte recently went out of business. The potential for this store to reopen and possibly expand its line of merchandise would be a possibility.

Alternatives 8 and 9 would provide less economic effect to any of the communities. Fewer jobs would be needed, and the experience necessary to fill the jobs would be more specialized.

Since *Alternatives 1A, 1B, 6A, 6B, 7A, and 7B* access the RM-1 Unit from US Highway 2, the tourist-based trade industries in the East Glacier Park and Browning areas could have a slight increase in trade for restaurant, motel, grocery store, and gas station businesses. The amount of trade would be dependent on the establishment of a crew camp. If a camp were not established, and workers chose to reside in either community, the increase would be higher than if a camp were established and these types of services were provided by the company.

Under any of the alternatives, if a crew camp was or was not established, food and camp-related services would most likely be purchased from local establishments in the larger communities, possibly Browning, Cut Bank, Great Falls, or Kalispell. These purchases would provide some indirect economic benefits to those communities on a short term basis.

As indicated in the economic section, no great influx of personnel could be expected with any of the alternatives. Any increases in population, during the exploration phase, would be short term. Because of the size of the community and its predominantly "tourist-based" industry, the community of East Glacier Park would notice the effects of any change more than other communities.

b. Attitudes, Beliefs, and Values

The types of workers associated with the oil/gas and construction businesses would be very different than the summer tourist or the fall hunter travelling through and utilizing the community's services. Some feel this mix of cultures would be incompatible. *Alternatives 1A, 1B, 6A, 6B, 7A, and 7B* would be most impacting to East Glacier Park because of their access locations.

Alternatives 1A, 2A, 6A, 6B, 7A, and 7B could have the most effect on residents of East Glacier Park, Browning, and Cut Bank for several reasons:

1) The access road would cut through a major part of the RM-1 Unit. This lengthwise cut through the area would be seen by some as irretrievable/irreversible destruction of the integrity of the roadless nature of the RM-1 Unit. Members of a group called the East Glacier Two-Medicine Alliance feel the RM-1 Unit should be designated wilderness, and are opposed to any development of the area (especially the location and amount of roading proposed).

2) Any access crossing the South Fork Two Medicine River, in the vicinity of Sawmill Flats (*alternatives 1A, 1B, 6B, 7A, and 7B*), could displace the many East Glacier Park, Browning, and Cut Bank residents who utilize the undeveloped "flats" as a camping area for their families and friends. Recreationists who oppose motorized recreation use of the RM-1 Unit feel that any disruption of the natural environment would hinder their enjoyment of the area. Man-caused changes, such as roading/drilling, would be seen as an intrusion or an unsightly disturbance of the natural landscape. Roading of the South Fork Two Medicine River drainage and Sawmill Flats could displace their recreation activities to the Bob Marshall Wilderness or Glacier National Park. They feel that development in the RM-1 Unit would be an irreversible change of the natural landscape.

   Conversely, motorized recreationists using the RM-1 Unit would be displaced only during the active exploration period (short term). Motorized users currently access the RM-1 Unit via Montana Power Company's pipeline, Pike Creek Road and Snowmobile Route 134, (*alternatives 1A, 1B, 6A, 6B, 7A, and 7B*). Snowmobilers use the Sawmill Flat area as a traditional recreation area. Motorcyclists/ATV riders utilize the South Fork Two Medicine River as their primary access route into the RM-1 Unit. After the activity is completed, snowmobiling opportunities could be enhanced if road access remained available for their use. If bridges were allowed to remain in place, the time of use for snowmobilers could actually be extended beyond the normal limitations due to "snowbridge melt". On-the-other-hand, motorcyclists/ATV users would be less supportive of roaded access, especially if trails were closed or obliterated, as travelling on roads would be less challenging than trail riding.

3) Pollution of the waters in the South Fork Two Medicine River would be a concern (regardless of whether an alternative actually crossed the river) shared by conservation groups, traditional religious groups, outfitters, livestock operators and some adjacent landowners. This concern is due to the perception that the government would not be able to adequately control and monitor the drilling operations sufficiently to maintain water quality.

4) The Blackfeet traditional practitioners believe that any alternative (regardless of location) would displace their religious practices from the area. Recently, a sweatlodge was constructed and used along the South Fork Two Medicine River near Sawmill Flats. Although the significance of the site is unconfirmed at this time, *alternatives 1A, 1B, 6B, 7A, and 7B* cross the river near the site and could affect any future use of this sweatlodge (see Section IV.L-Cultural Values).

   Traditional religious groups also are concerned that *alternatives 1A, 1B, 6A, 6B, 7A, and 7B* could affect the grizzly bear, considered a sacred animal in the Blackfeet religion. Disturbance of the riparian areas and bottomlands in the South Fork Two Medicine River drainage would be perceived as damaging to the continued existence of the bear.

5) *Alternatives 1A and 1B* would be most disruptive to the outfitter guides, as these alternatives would obliterate much of the existing Trail 101 between the South Fork Two Medicine River crossing and Badger Cabin. This segment of trail is used by two permitted outfitters that conduct operations in the RM-1 Unit. They believe that roaded access from *alternatives 1A, 1B, 6A, 6B, 7A, and 7B* would alter the natural unroaded landscape and diminish the backcountry experience that their clientele seek.

   Alternative 2, where it traverses Tribal lands and east of Whiterock Pass, would remain open. Although it does not directly pass through Heart Butte, it may temporarily displace those from Heart Butte from using the Whiterock Road during the exploration activity. The feelings of Heart Butte residents over the future use of the road following any exploratory drilling is mixed. Some would view the improved road as a benefit, especially if it was managed as an open road beyond its' current Travel Plan closure. Others, particularly the traditional religious practitioners, view any improvement of the existing road, and the associated increased use, as a detriment to their continued use of the area for religious purposes. Refer to Chapter IV.1.L. for additional information on the effects to Cultural/ Religious practices. Residents of East Glacier Park and Browning could find this alternative slightly less objectionable, since an established road is already in place and the location is a distance from their normal access points.

   Many of the Heart Butte residents, like many of the East Glacier Park and Browning residents have strong ties to the land. Because of their physical location to the RM-1 Unit, many equate development in the unit (via *alternative* 2) with bulldozing their own property. Heart Butte residents would be least affected by *alternatives 1A, 1B, 6A, 6B, 7A, and 7B*. East Glacier Park residents would be least affected by *alternative* 2.

   Alternatives 8 and 9 would be less objectionable to individuals who prefer to see the RM-1 Unit remain roadless. Individuals who value the roadless nature of the RM-1 Unit are: conservation groups in the East Glacier Park community, Blackfeet traditionalists in Browning, Heart Butte, and surrounding areas, the outfitters, some of the local landowners, and non-motorized recreationists. Although most would continue to oppose the drilling operation, accessing without roads would be considered less of an intrusion on the land. These people have expressed their doubt about the Forest Service's ability to enforce road closures and/or restrictions. They feel that government control of poaching from existing roads is currently inadequate, and therefore, are highly suspicious of the perceived effects from additional roading.

   Some local retailers in East Glacier Park would support the activity with the hope of receiving some spinoff economic benefits to their businesses. Any of the roaded alternatives would be most appealing to business people in the Cut Bank and Browning areas. The business people are anxious to rejuvenate the interest in the oil and gas activity in their locale. They feel that interest on the National Forest System lands could ultimately stimulate renewed interest on the reservation and surrounding areas. Helicopter access, in their minds, would not be cost-effective and could discourage the company from proceeding with exploration of the well. The business people support oil and gas exploration, because they feel that oil and gas development would be an appropriate multiple use of the National Forest. They are cautiously optimistic about the federal government's ability to adequately monitor and control the drilling and associated activities.

c. Social Organization

Exploration drilling would be too short a time period to have any significant effect on any community's social structure.

The difference in the land use philosophy, between those favoring and those opposing development, could cause some community fragmentation. *Alternatives 1A, 1B, 6A, 6B, 7A, and 7B*, because of their close proximity to East Glacier Park, could serve to widen the gap between those favoring and opposing development.

The difference in opinion over the religious significance of the RM-1 Unit among the Blackfeet people could either widen an already existing gap between the members, or unite them in a common cause for protection of their cultural and religious practices. Some contend that the RM-1 Unit is sacred ground in need of protection from all development. Others feel that the area is the last vestige of undeveloped land that traditional religious practitioners have available for their use. And still others feel that the RM-1 Unit is not significant nor necessary for tribal religious practices. *Alternative 2* would be the most controversial access point for those tribal members contending that the area is indeed important for religious purposes. Refer to Section IV.1.L. for additional information on the effects to Cultural/Religious practices.

d. Alternative 12 would have no effect on social structure and lifestyles.

Reasonably Foreseeable Actions

A Dry Hole

Exploration drilling of another well would expand the effects discussed in the exploration proposal. Those opposing exploration have expressed the opinion that "one hole leads to another". Drilling of an additional exploratory well would lend support to their opinion. Those supporting exploration would probably continue their support, provided the activity was administered and monitored to their satisfaction.

A second exploration well would increase the length of time for any disturbance and/or benefits to the communities.

A One Well Production

The production from one well would not affect the lifestyles in the surrounding area. Production would be viewed favorably by local oil and gas business interests in the Cut Bank and Browning areas, due to the increased potential for economic gain.

Production facilities would be viewed as more permanent intrusions on the land. Anyone opposing roaded development in the exploration proposal (nonmotorized recreationists, conservation groups, landowners, outfitters, traditional religious practitioners) would more strongly oppose the production development. Any pipeline (although it would be underground) would be perceived as a permanent subsurface encroachment. Although it would not be as offensive visually, it would remain a subsurface intrusion for those who value the "wild" natural character of the RM-1 Unit. Any production facilities (sweetening plants, etc.) would be strongly opposed by the aforementioned groups.

Production would also intensify the concern for maintaining water quality and air quality. Perceived problems of pipeline leaks and associated resource damage would be increased with the production scenario.

Should *alternatives 8 or 9* have been used for exploration, roaded access for pipeline construction would be needed and the effects to attitudes, beliefs, and values would be similar to those discussed for the exploration proposal. Those willing to compromise and support selection of an unroaded alternative for the exploratory phase (playing the odds of a low chance for discovery), may not support roading/pipeline development. Those opposed to development would view production as a permanent loss of the roadless character of the RM-1 Unit.

Location and extent of production and transport facilities would be a concern sor all interested in the RM-1 Unit. Those East Glacier Park residents who base their livelihood on tourist trade would oppose any facility locations within sight or smell of the US Highway 2 travel route.

Some tribal members would oppose production facilities on National Forest System lands, where it could decrease their enjoyment and use of the roadless area for religious purposes (*especially alternative 2*). Refer to Section IV.1.L. for additional information. Some Heart Butte and Browning residents would be supportive of the facilities being located on their lands or their Counties with the hopes of generating a tax base fund for their Counties.

Should *Alternatives 1A, 1B, 6A, 7A, or 7B* be used for access, the effects on recreationists, as discussed for the exploratory phase, would continue for the life of the well.

There would be no effect to the social organization of local communities.

A Field Production

If a significant discovery resulted in a field development, the County revenues would be increased. Tax-based dollars could be used in the local communities for improvements. Oil and gas-related businesses, particularly in Cut Bank, would have the greatest economic opportunities, since the training and businesses are already established. More jobs would also become available for those seeking employment. *Alternatives 1A, 1B, 6A, 6B, 7A, and 7B* would be most beneficial for the Browning/Cut Bank and East Glacier Park communities. *Alternative 2* could be most beneficial for those seeking employment from the Heart Butte area.

It would be difficult to project whether new business ventures would spring up in small communities like Heart Butte. Any potential for longer term employment and the associated needs for spinoff business ventures would be dependent upon the amount of development, and the location of treatment facilities.

Under *alternatives 1A, 1B, 6A, 6B, 7A, and 7B*, housing needs for longer term and larger numbers of employees could become a problem for the East Glacier Park community, where housing is limited. This could cause the cost of housing to rise. Local retailers could find their current tourist-based industry converted to a more oil and gas service economy. This change could be difficult for some residents.

Those who utilize the Sawmill Flats area and the Two Medicine drainage for their recreation pastimes and livelihood (nonmotorized recreationist, snowmobilers, motorcyclists, ATV users, environmentally-oriented groups, outfitters, some adjacent landowners, some livestock operators, and religious traditionalists) would be displaced from the area for the life of the field with *alternatives 1A, 1B, 6A,6B, 7A, and 7B*.

Those opposed to all development in the RM-1 Unit would view the opportunity for a roadless management outcome lost for the foreseeable time.

Concerns for water and air quality would be heightened. Suspicion over the government's ability to monitor and restrict motorized recreation use and control poaching would also be intensified.

Generally, anyone opposed to the exploratory phase would also be opposed to field development. Their concerns would be increased due to the larger scale development.

Changes to the local social organization would be most likely to occur with a full field production. The amount of change would be dependent upon the extent of the gas and oil resource.

O. HEALTH AND SAFETY

This section discusses the health and safety concerns expressed by the public in relation to oil and gas exploration and production. Concerns identified during the scoping process included road use and public safety, the need for emergency plans for surrounding areas in the event of a well blowout and potential health risks to nearby communities and people who use the area. In addition, concerns were expressed for the effects of hydrogen sulfide emissions on vegetation and animals, the effects of toxic chemicals used during drilling, and gas leakage from sweetening plants.

The effects of traffic hazards (vehicle and helicopter), possible blowouts and/or hydrogen sulfide releases and other contaminants are discussed. This discussion applies to the effects likely to occur. Mitigation measures that would be needed to minimize the effects are discussed for individual effects.

Exploration Proposal

a. Road Use and Public Safety

Alternatives 1A, 1B, 6A, 6B, 7A, 7B,and 8, would create a slight increase in traffic delays, and vehicle encounters on US Highway 2, from construction and project vehicles entering and leaving the Highway. There is potential under these alternatives, for increased traffic through the community of East Glacier for the duration of the drilling project.

Alternatives 1A, 6A, and 7A could cause traffic conflicts between project vehicles, and recreation vehicles near the Summit recreation area, along Pike Creek road No. 8958.

Alternative 2, would entail use of FS Road 9128 through Palookaville. Traffic would increase along this route during the drilling period.

An increase in road traffic on any road alternative could increase the potential for vehicle accidents or safety conflicts between pedestrians, equestriennes and vehicles using the same roadways. Winter-time road use, or road use at times of the year when the roadbed was not be in ideal condition, could create hazards to humans and surface resources.

All (roaded) alternatives would involve gate closures at strategic points, as a means to prevent motorized public travel conflicts with drilling activity.

Alternatives 8 and 9, with helicopter access, could create a hazard for recreationists using pack animals, or on horseback. Helicopter over-flights, and associated noise could cause disruption among a pack string, or to a rider's horse, and could result in personal or animal injury. Helicopter over-flights can be routed to avoid flights over heavily used trails and recreation areas.

The transportation of heavy loads, carried below the helicopter, would create a low hazard to Forest users, in the event of an equipment malfunction or a helicopter mishap. Safety records by companies conducting this type of work in other areas has been extremely good (Lazzaretti, 1986).

The use of helicopters, to transport drill crews and other personnel to and from the drill site, could cause a safety problem for drill site workers, should emergency evacuation be required. In adverse weather conditions, flights for emergency medical assistance could be postponed or carried out at greater than normal risk of flight mishap.

While helicopter operations have a record of safe and efficient operations, alternatives 8 and 9 would present safety concerns for the operator. It would be difficult to bring in immediate medical help in poor flying conditions. In the event of a blowout, there could be a significant delay to bring the blowout under control.

These alternatives would also present access problems for routine BLM and Forest Service inspections of the operations.

b. Accidental Blowouts

An uncontrolled flow of gas, oil, and other well fluids from a well to the atmosphere is referred to as a "blowout". A "blowout" must be considered in all the drilling alternatives. Based on drilling information in the Overthrust Belt, the probability of a blowout occurring in the Overthrust Belt is approximately 0.24% (Lawrence Livermore National Laboratory, 1984). (The probability of the both Chevron and Fina wells having blowouts is 0.0625% (probability of each well, 0.25%, is multiplied)). It is also important to note that the probability of not having a blowout occur is approximately 99.75%. The average duration of a blowout ranges from 1/2 day to about 10 1/2 days (Lawrence Livermore National Laboratory, 1984).

An accidental blowout could pollute the air with any of the following: 1) natural gas with hydrogen sulfide, 2) a gas composed primarily of carbon dioxide with minor hydrogen sulfide and methane, or 3) sulfur dioxide and other combustion by-products resulting from ignition of a gas composed mainly of methane. Each mixture of gases would have the potential to harm plants, animals and humans. Hydrogen sulfide is the primary gas that is associated with Overthrust Belt production of oil and gas in Alberta, Utah, Wyoming and in Montana's Blackleaf Canyon field along the Rocky Mountain Front.

Hydrogen sulfide (H_2S) is a colorless, highly toxic and flammable gas, sometimes encountered in lethal concentrations with methane in oil and gas wells. Hydrogen sulfide is heavier than air, and tends to disassociate from the gas stream and sink to lower levels. Much of the danger in hydrogen sulfide occurrences is the tendency for the gas to collect in low-lying areas, such as drainages--especially when wind conditions are calm.

Hydrogen sulfide smells like rotten eggs in low concentrations (Table 4.12), but prolonged exposure tends to dull the sense of smell. As little as .002 ppmv (parts per million by volume) or .0000002% can be detected by smell (Lawrence Livermore National Laboratory, 1984) and odor annoyance is the most widespread chronic effect of atmospheric emissions of hydrogen sulfide. In ranges from 100-150 ppmv, the sense of smell is quickly lost, giving a false sense of security. In these concentrations, it can also cause throat and eye irritations. In concentrations of .10% (1000 ppmv), animals and humans would become unconscious at once, with death resulting if not administered to immediately.

Humans can tolerate eight hours per day of exposure to levels up to 20 ppmv (parts per million by volume) as determined by Occupational Safety and Health Association (OSHA). This is the maximum allowable concentration for work conditions without protective equipment. There doesn't appear to be any cumulative effects to the body from repeated exposures of hydrogen sulfide. This may be due to the solubility of hydrogen sulfide in water where it disassociates to hydrosulfide and elemental sulfur depending on the pH of the solution. Any hydrogen sulfide that becomes absorbed in the blood is rapidly oxidized to a nontoxic form and is also noncumulative (Lawrence Livermore National Laboratory, 1984). Table 4.12 below summarizes the toxic effects of hydrogen sulfide on humans and animals at various concentrations and exposure times.

Table 4.12
Summary of Toxic Effects of Hydrogen Sulfide (H_2S) on Humans Based on Animal Studies as Well as Actual Exposures to Man

Concentration(1) ppmv	Exposure time	Effect
0.005-0.007	0-2 min.	Median odor threshold
1-10*	0-2 min.	Can smell
1-10	1-4 hrs.	Mild throat irritation, can smell, eye stinging throat irritation
20*	0-2 min.	Upper 8-hr. safe limit. Can smell, safe for 5 hrs.
20	1-4 hrs	Eye Stinging, throat irritation, may kill smell
50*	0-2 min.	Mild eye, throat irritation, kills smell in 15+ minutes.
50	1-4 hrs.	Coughing, eye irritation, smell killed
100*	0-2 min.	Coughing, irritation of eyes, kills smell in 3-15 minutes
100	1-4 hrs.	Burning of throat, coughing, sharp eye pain, throat pain.
200*	0-2 min.	Kills smell quickly; severe throat and eye irritation; coughing.
200	1-4 hrs.	Difficulty breathing, sharp eye pain, blurred vision, cannot smell.
250 (3)	20 min.	Unconsciousness
500-1,000 (2)	< 2 min.	Respiratory arrest, unconsciousness, pulmonary edema or death.
2,000 (2)	< 10 sec.	Respiratory arrest, unconsciousness, pulmonary edema or death.

(1) For a pressure of 1 atm and a temperature of 60 F.
(2) Animal data
(3) Based on one incident

* Figures are from Kruger (1987). All others are from Lawrence Livermore National Laboratory (1984).

The Lawrence Livermore National Laboratory (1984) report on accidental releases of sour gas from wells and collection pipelines in the Overthrust Belt, found that after drilling over 35,000 wells in the Alberta portion of the Overthrust, 83 releases of gas occurred (regardless of the type of gas) for a frequency of releases of about 0.25% of the wells. There have been only two recorded incidents in which accidental emissions resulted in fatalities among residents living near sour gas facilities. The first involved a malfunctioning gas purification plant at Poza Rica, Mexico in 1950 and the second event occurred in 1975 near Denver City, Texas, when an atmospheric discharge resulted from the failure of a pipe fitting on the wellhead of a well injecting carbon dioxide plus hydrogen sulfide into an oil reserve. In both cases, several people died. The report included a worst-case scenario which calculated the risks of an acute health effect due to gas release over the 20-year life of a well as being "on the order of .0001 to .00001--similar to the risk of accidental death caused by a natural disaster over the same period."

An actual large blowout that occurred west of Edmonton, Canada measured a 15 parts per million hydrogen sulfide concentration for a 24 mile radius around the well (Energy Resources Conservation Board, 1984). The well product had a hydrogen sulfide concentration of 23-25% and an estimated volume of 49.4 MMCF/day to 74.2 MMCF/day (MMCF= million cubic feet). The blowout continued for a period of 67 days. The inhabitants of the area were monitored for health effects of the blowout and showed temporary effects such as headaches, respiratory problems and gastrointestinal symptoms. The amount of hydrogen sulfide measured at residences within a 12.5 mile radius of the well never exceeded 20 parts per million. This blowout was considered by the Canadian Government as a worst case example of an hydrogen sulfide blowout.

In the air quality report prepared for the Blackleaf EIS (Kruger, 1987), a worst case blowout analysis was developed. This analysis uses a concentration of 15% hydrogen sulfide by volume and worst case meteorological and blowout conditions. For comparison, the average percentage of hydrogen sulfide concentration for wells drilled in the Blackleaf field is 0.4% . The resulting effects from the analysis indicate that a concentration of 15 parts per million hydrogen sulfide could occur for a 2 mile radius area around the well (Kruger, 1987). A concentration of 100 parts per million hydrogen sulfide (concentration at which noticeable human effects would occur in a short period of time) was calculated to affect an area of approximately 300 feet in radius around the well site.

The hydrogen sulfide concentrations for the proposed well area are anticipated to be similar to concentrations found by drilling in the Blackleaf area (0.4%). Higher hydrogen sulfide concentrations (greater than 5%) that may be found in the Overthrust Belt are related to the occurrence of interbedded anhydrites in the Madison Group formations (Werren, 1985). Interbedded anhydrites in the Madison Group have not been found in the Blackleaf or Badger-Two Medicine area.

An analysis of an extreme hydrogen sulfide blowout situation combined with worst-case meteorlogical conditions (stable air with gas discharged at the surface without a plume), indicates that in a worst case situation, the hydrogen sulfide would exceed 300 ppm concentrations for an area about a mile surrounding the drillsite. Beyond this area, worst case hydrogen sulfide concentrations were predicted to be below 300 ppm and any changes in discharge or wind conditions would dramatically decrease the radius of significant concentrations of hydrogen sulfide (Lawrence Livermore National Laboratories, 1984).

The release of liquid materials (drilling fluids, impure formation waters, and/or oil or natural gas condensate) could also occur during a blowout. These liquids could spread some distance from the well site, where they may contaminate soils, vegetation, and surface water. Depending on the volume released and area contaminated, degradation of soils or water quality could result. Intensive cleanup and reclamation efforts would be required, and it could be some time before vegetation would be reestablished on soils that had been contaminated with materials resulting from a blowout (Dames and Moore, 1986). A hydrogen sulfide contingency plan is included in Appendix B. Mitigation measures pertaining to uncontrolled leaks of hydrogen sulfide and other gases are found in Chp.V-Mitigation and Monitoring.

In studies dealing with the effects of hydrogen sulfide on plants, foliar damage or reduced yields were exhibited from continuous exposures of 0.3 and 3 ppmv concentrations, but not at concentrations less than 0.03 ppmv. Weeds treated to daily 4-hour exposures of concentrations of 100 and 500 ppmv of hydrogen sulfide for six weeks showed that a significant percentage of leaf area (74%) was affected by 500 ppmv treatments compared with 18% of leaf area affected by the 100 ppmv exposures. Fumigations with sulfur dioxide at concentrations of 2 and 5 ppmv resulted in leaf markings over 8 and 11% of total leaf area (Lawrence Livermore National Laboratory, 1984).

Although the hazards associated with hydrogen sulfide are serious, precautions taken while working in a hydrogen sulfide environment greatly reduce the risk of a hazardous event taking place. The oil industry has a long history of production of petroleum containing hydrogen sulfide. This experience has lead to industry-wide standardized safety procedures. The population at the greatest risk to emissions are the drill rig and facility workers.

Monitors would be installed in the well and special safety procedures followed. The pH of the mud system will be maintained at a level to hold as much hydrogen sulfide in solution as possible while drilling. If hydrogen sulfide is present in small amounts, scavenging agents such as zinc carbonate will be added to the drill mud. These chemicals react with the hydrogen sulfide to produce precipitates. Greater levels associated with unexpected gas invasions would be controlled by ironite sponge, but excessive quantities might force termination of drilling until gas invasion is stopped.

The American Petroleum Institute has established recommended practices developed by the petroleum industry prescribing safety guidelines and procedures for conducting drilling operations where hydrogen sulfide gas may be encountered. Under these established procedures, the chances for a hydrogen sulfide escape of any magnitude would be minimal (Kruger, 1981). Signing at the wellsite during times when drilling may encounter hydrogen sulfide and advance notification to proper personnel can also serve to reduce likelihood of persons being exposed to potentially dangerous situations.

The preparation of a contingency plan by the operator is required by Draft Onshore Oil and Gas Order No. 6 for oil and gas drilling operations where it is known or reasonably expected that hydrogen sulfide will be present in hazardous concentrations, or where its presence or absence is unknown. This Order outlines personnel protection measures, including training, use of protective equipment, monitoring and warning systems. It also requires that the operator submit a contingency plan that provides details of action to alert and protect the public in the event of an accidental release of hydrogen sulfide. This plan shall include the responsibilities and duties of key personnel, instructions for alerting the public and requesting assistance, a list of names and phone numbers of residents and a definition of how they are to be notified.

The Order requires that the contingency plan include a plat map showing a 2-mile radius around the wellsite of all private and public dwellings and other areas where the public might reasonably be expected to be present. Chevron has prepared a Hydrogen Sulfide Contingency Plan for their proposed project that outlines safety plans and emergency procedures for personnel and general public in the event of equipment failures and/or disaster when formations that may contain hydrogen sulfide and carbon dioxide are being drilled (Appendix B).

In the event of an hydrogen sulfide escape, trails in the area would have to be closed to public travel until the escape is controlled and eliminated. For the Chevron location, these would be portions of trails 101,103, and 104 (Map 3.5). These closures are based on a 15 parts per million exposure level at a 2 mile distance. Air quality monitoring would be done on downwind trails from the drill rig if an accidental release occurs to monitor exposure levels to assure adequate closures to protect the public.

The other gases that could be encountered are sulfur dioxide, carbon dioxide, and methane. See the discussion under a One Well Production for other gases.

The use of toxic chemicals during drilling would not be allowed, as discussed in the water resources section (Section IV.1.B).

Alternative 12 (no action) would result in no drilling, and consequently no effects on health or safety beyond any that may presently be existing in the area.

Reasonably Foreseeable Actions

A Dry Hole

It is anticipated that Chevron would drill a second hole, should the first hole prove to be dry. This would increase the duration of effects incurred while drilling the first hole. The health and safety effect would be similar to those discussed for the exploration proposal, but for a longer duration of time.

A One Well Production

Production concerns includes that of leakage from pipelines or the well bore which could cause health concerns from the hazardous gases described previously. Some liquids may be separated at the wellhead, thereby eliminating their transport via pipeline. Depending on the size of the leak and gases present, hazard potential could be extensive or minor. Many of the reported incidents involving hazardous exposures of hydrogen sulfide are related to malfunctions in pipe fittings or at gas processing plants. Close wellhead and pipeline monitoring would be mandatory to ensure public and resource safety.

The amount of vehicle traffic on the access road for alternatives 2, 6A, 6B, 7A, and 7B would decrease from the amount of vehicle traffic during drilling and road construction. Therefore, the risk of vehicle accidents would also decrease. After a production history has been established for the well, it is possible that regular trips to the well site may be decreased significantly.

Alternatives 1A and 1B would involve construction of a higher standard road for service and maintenance of the well site. The effects of road use and public safety during construction and drilling would be similar to those discussed for the exploration proposal until the road is completed and regular traffic resumes.

Alternatives 8 and 9 would require construction of road access for service and maintenance of the well site. The effects of road use and public safety would be similar to those discussed for the exploration proposal until the road is completed and regular traffic resumes.

With the completion of drilling and installation of the wellhead, the risk associated with a blowout would be past. Inspections during production would be needed to monitor for any hydrogen sulfide and possible leaks.

The potential for hydrogen sulfide would exist. Any effects would be similar to those discussed for the exploration proposal.

Sulfur dioxide (*SO_2*) is also a toxic gas and can be hazardous if inhaled. It is produced by the burning of hydrogen sulfide. Sulfur dioxide is an irritating gas, and in extreme cases can cause chemical pneumonia. In concentrations between 1000-2000 ppmv, exposure to sulfur dioxide can be life threatening. The Threshold Limit (limit at which humans can be exposed to the substance day after day without adverse effects) for sulfur dioxide is 5 ppmv or .0005%. It can be more phototoxic to plants than hydrogen sulfide. Experimental effects on leaf areas of weeds varied with exposure levels and times (Lawrence Livermore National Laboratory, 1984).

Carbon dioxide (*CO_2*)(in excess of 50%) can prevent the ignition of the released gas and can also form a more buoyant plume with less toxic ground-levels of sulfur dioxide. The closest producing gas wells in the area, the Blackleaf Canyon wells, contain about 16% carbon dioxide. Carbon dioxide is 1.5 times heavier than air and can accumulate in low-lying areas. Carbon dioxide is a respiratory stimulant as well as an asphyxiant. The threshold limit for carbon dioxide is 5000 ppmv. Humans cannot breathe air containing >10% of carbon dioxide without losing consciousness.

Methane (CH_4) is the major component of natural gas. It is colorless, odorless and combustible. The chief danger of the presence of large quantities of methane gas is explosion. This has been more a problem with domestic uses of hydrocarbon products than during drilling or production phases. The gas is also quite poisonous, as well as explosive, if not burned safely. Methane can be tolerated without breathing apparatus to levels of 90,000 ppm (9%).

Concerns of health effects of environmental contamination caused by oil and gas processing activities prompted the Alberta (Canada) Acid Deposition Research Program, in conjunction with the McGill Inter-University Research Group (McGill, 1986), to conduct an extensive medical diagnostic review to determine in a conclusive manner whether residents living near the Waterton Shell gas plant experienced health problems in greater or lesser measure than Albertans in demographically similar areas. The shell plant processes nearly 425 million cubic feet of raw gas per day. The hydrogen sulfide concentration in the gas is about 15% by volume, from which is recovered nearly 3200 tons per day of sulfur. For comparison, the wells in the Blackleaf field west of Bynum, Montana contain on the order of 0.4% hydrogen sulfide.

Residents were tested for cancer incidences, birth risks, presence of trace metals, lung functions, and other health concerns. The investigators overall conclusion after a year of intensive research was that "[f]or all the foregoing concerns the investigators have not detected objective evidence to perpetuate the concerns. The investigators are confident of the scientific basis of that reassurance. With respect to symptoms or how people feel concerning possible contamination of their environment, there is a small difference suggesting greater concern and more awareness of one's health and one's sensations among residents in the (area adjacent to the plant)...The investigators recommend that further clinical, epidemiologic or demographic studies involving new data collection on the field not be done."

No oil and gas processing facilities are proposed by Chevron. An analysis of possible facility siting areas (see Appendix L) shows the general suitability of areas in and around the RM-1 Unit for production facilities.

A Field Production

Development of a field, would generate considerable activity. The amount of increase in activity would be dependent on well locations, and the amount of production from the wells.

Traffic delays and vehicle encounters on US Highway 2, would continue, as would the potential for increased traffic through the community of East Glacier. The most traffic would occur while the well field was being established, and any pipelines required were constructed. The additional traffic would increase the potential for vehicle accidents and safety conflicts, similar to those discussed for the exploration proposal. Road use restrictions would reduce traffic conflicts and maintain safe conditions.

While drilling and placing additional wells in production, the risk of a blowout would increase slightly. The potential for a blowout to occur would be better known after the first well was completed. Precautions to prevent or control the potential for blowouts would be taken by the proponent. For further discussion see the discussion for the exploration proposal.

While drilling, the potential for encountering hydrogen sulfide would increase. The effects would be similar to those discussed for the exploration proposal.

The potential for other gases would increase slightly with the drilling and operation of additional wells. However, the same mitigation measures as for the one well would apply.

Any sweetening plants would be as discussed in the analysis of possible facility siting areas (Appendix L).

2. FINA PROJECT

Fina Oil and Chemical Company has proposed to drill an exploratory well on lease M-53323 in the SE1/4 NE1/4 of Section 26, T.30N., R.13W., in Glacier County, Montana. This location is the northeast side of Two Medicine Ridge. The well would be drilled to a total depth of over 13,000 feet and would take approximately 255 days for construction, drilling, testing and reclamation. The company has identified 3 possible access route alternatives varying in length from 6 to 9 miles. All proposed routes would begin at US Highway 2 and would cross the South Fork of the Two Medicine River. All alternatives would require some new road construction. The proposed access road would be 14 feet wide with maximum grades of 6%. Road construction standards would be subject to approval by the Forest Service.

In the APD, Fina has not proposed any production activities. The APD was submitted to drill a well to test for production capacity and complete the well. Casing would be set at 1,500 feet and the reserve pit would be lined to protect ground and surface waters. Water would be hauled or piped from the South Fork of the Two Medicine River to make up the circulating fluid. Cuttings and water base drilling fluids would be contained in a reserve pit. If the well is abandoned, the drilling mud may be injected into an approved subsurface zone. Any produced fluids would be put into tanks and removed from the site. Spills would be cleaned up and removed.

Fina's proposal includes using a crew camp to minimize road traffic. Approximately 20 vehicles per day would be using the road to access the wellsite during drilling. Crew facilities would include 6 trailers that would provide eating, sleeping, bathing and recreational facilities. The sewage system will conform to the requirements of the Glacier County Board of Health. Garbage would be burned or contained, and periodically hauled to an approved disposal site to avoid attracting bears.

During construction, topsoil would be stripped and stockpiled and used during reclamation. Reclamation would commence as soon as the rig is removed. The surface would be recontoured and reseeded and steps would be taken to minimize erosion prior to a good vegetative cover. All wastes would be removed to an approved disposal facility. The following Section (IV.2.A.) discloses the effects of Fina's proposal and alternatives according to the issues identified in Chapter I.

A. OIL AND GAS EXPLORATION AND PRODUCTION

An issue expressed by the project proponent during the scoping process questioned: How best to manage the cost of exploration and production while minimizing effects on the environment. An increase in the cost of exploration and production would require a greater gas and oil reserve to recover expenditures for drilling, producing, and marketing any gas or oil found. Thus, it is necessary to include in the analysis how the alternatives and mitigation measures will affect the proposed operations and possible future oil and gas activities.

Analysis of the alternatives gives an indication of the potential effects on exploration and development for oil and gas in the RM-1 Unit. The alternatives are discussed in terms of costs to the company, logistical considerations, safety and the degree to which the company's operations and lease rights would be affected because of mitigation measures imposed for the protection of other resources. Costs are determined separately for each alternative.

Mitigation effects are discussed for individual effects, as applicable.

Exploration Proposal

For the roaded alternatives, the drilling project would probably be spread out over a period of 2 to 3 years due to a restricted operating window (see Chp. V Mitigation). The operating window is from July 1 to November 30, a period of 5 months. This operation time period assumes that the first year would be for road construction and drilling and the second and third years for reclamation. Project costs for construction, drilling and reclamation would be similar for the roaded alternatives. Some trail relocations could be required for each alternative. The number of miles of trail and crossings are listed in Table 4.13. Traffic during the exploratory drilling phase would average approximately 20 vehicles per day. After exploratory drilling was completed and the site reclaimed (if the well was abandoned), oil and gas-related traffic would cease.

Alternatives A2, B2, and C2 would all be similar in length and costs to construct, as they disturb very close to the same number of acres, would require bridge construction over the South Fork of the Two Medicine River and would have similar rehabilitation costs. Any of these alternatives would allow hydrocarbon resources to be explored at the minimum costs to the company.

Alternative D1 would be a longer distance from a good all-weather highway (US Highway 2), and would cause an increase in costs over alternatives A2, B2, or C2. Since the area disturbed would be almost twice what alternatives A2, B2, or C2 would be, the costs of rehabilitation would also be considerably more. This alternative could have more steep grades than the other roaded alternatives, making it more difficult to move equipment to and from the well site during poor weather and road conditions.

Alternatives F8 and F9 would require helicopters for access to the well sites, with some road construction for access to the helicopter staging areas. In discussing helicopter access, cost, technical feasibility and safety issues are considered. The following discussion assumes that the drilling project would take 2 to 3 years with the required window of operation. The first year would be for pad construction and drilling and the second and third years would be for reclamation, in the event of a dry hole.

Both helicopter alternatives would result in similar costs. It is estimated that the cost would be over 2.5 times (250% +) greater than the roaded alternatives. This cost estimate does not include the additional costs that would be incurred from hauling crews since it is recommended that no crew camp be allowed (Chp.V-Mitigation, Wildlife), nor does it include additional costs in the event of downhole technical problems. In the event that oil and/or gas is found in commercial quantities, road construction would also be required at additional cost to the company.

The technical feasibility and safety issues involved in a helicopter operation are discussed in detail under the helicopter alternatives for the Chevron proposal in Section IV.1.A

Alternative E (no action) would cause no effects to the environment. It would deny Fina the opportunity to explore and obtain geologic information in conjunction with their lease.

Reasonably Foreseeable Actions

A Dry Hole

Should the exploratory well prove dry, Fina may desire to drill a second well to further test the structure. Effects from drilling a second well would be similar to those for the exploratory hole except access would be largely in place under a roaded alternative. Any slight additional cost of road building (up to one additional mile), would make the roaded alternatives much more attractive than the cost of a second well using helicopter access. Prior to approval, an environmental analysis would be conducted, incorporating appropriate information obtained from drilling the previous well.

A One Well Production

In a single well field, Fina has proposed locating the production facilities near US Highway 2, and pipelining all production from the well site to the production facilities. These facilities would consist of a separator, storage facilities for any condensate or oil, sweetening facility for the gas, and a gas meter to meter gas production sales.

Under all alternatives, Fina would need access to the producing well to monitor and maintain the well and production facilities. Remote monitoring of production will be considered as an opportunity to reduce wellsite visits. Fina would need to develop a production and monitoring plan that satisfies the requirements identified on their lease. This includes a responsibility to comply with the Endangered Species Act (Appendix A, page A18). Production and remote monitoring considerations are discussed in more detail in Chp.IV.1.A.-One Well Production.

Costs of production facilities and pipelines are expected to be comparable for all alternatives and are not differentiated in the analysis.

Alternatives A2, B2, and C2 would provide a long term roaded access for future oil and gas activity. These alternatives would provide a suitable pipeline route, and could result in a production facility near US Highway 2 on an all-weather highway. Any of the routes would cross the South Fork of the Two Medicine River which poses a possible pollution risk if petroleum products were spilled at or near the crossing. *Alternative A2* may cost less than *alternatives B2 and C2* because there would be less of an elevation climb from the South Fork Two Medicine River to US Highway 2.

Alternative D1 would not be as good an access for one well production, due to the longer distances involved in getting from a main highway to the well location to monitor wellhead conditions. The main pipeline along this route would be longer than the pipelines for *alternatives A2, B2, or C2*, increasing the danger of pipeline spills. The cost for maintenance would be greater than for the other alternatives.

Alternatives F8 and F9 would require construction of an access road to service the well. This construction would result in a significant delay to bring the well into production. One of the roaded alternatives would likely be the production route. The cost of helicopter access for exploration drilling, and road construction cost for production would increase costs approximately 250% over the roaded alternatives.

A Field Production

Production and development of a multi-well field would require additional roads to well sites and facilities. Feeder pipelines, storage and treatment facilities, and attendant monitoring systems would also be required for any other wells within the field. As discussed under the One Well Production Scenario, the investment made in the initial road and development facilities would contribute to an overall development strategy for future activities. This is discussed in more detail in Section IV.3.

B. WATER RESOURCES

This section discusses the effects on the water resources. Several issues were expressed during the scoping process related to whether water quality would be adversely impacted by a drilling operation (both surface and ground water). The issues were as follows:

1. Water quality could be adversely affected, and involves surface water and ground water (including rate of movement and quality).

2. Drilling fluids used contain certain toxics that could affect the subsurface environment and hydrology.
3. Rupture of a pipeline could contaminate streams and water supply for downstream users.
4. Reduction of water quality could result from sedimentation, siltation, runoff, and erosion potential of unstable soils due to road construction.
5. Increased sedimentation from road construction could impact riparian habitat. Floodplains and wetlands are discussed in Section IV.2.I-Vegetation.

The following discussions on environmental effects are divided into subsections on surface water, ground water, and water use. Effects on surface water include the potential for increased sediment as a result of construction activities and traffic. Effects on groundwater include pollution from surface contaminants such as oil or petroleum-based products and contamination from drilling. Effects from water use include the amount of water needed and the potential hazards to ground water. Management practices and guidelines commonly used to mitigate activities that may affect water quality are given where appropriate. Mitigation is discussed in greater detail in Chp.V-Mitigation and Monitoring, Water Resources and Fisheries.

Exploration Proposal

a. Surface Water

The effects on surface water resources that would result from the implementation of the various alternatives for the Fina Project are generally the same as for the alternatives for the Chevron Project (Section IV.1.B.). The hazards discussed for the Chevron Project would exist, and the same regulations would apply.

Effects on surface water quality are compared, by alternative, on the basis of the cumulative increases in sediment produced above the natural sediment yield (see figures below). This information was generated from a sediment model developed for Forest Service Region 1 and Region 4 (Cline and others, 1981). The value of the estimates is limited to comparison between alternatives because of the low accuracy of the coefficients used in the model. The estimates are based on a 5-year period that starts with road construction. An assumption was made that best management practices and guidelines, described later in this section, would be implemented. The major watershed that may be affected by the Fina project is the South Fork Two Medicine River watershed (Map 3.3).

Alternative	**Sediment Yield**
Alternative A2	1.3 tons
Alternative B2	3.1 tons
Alternative C2	1.9 tons
Alternative D1	3.1 tons
Alternative F8,F9	No measurable increase above natural levels
Alternative E	No sediment above natural levels.

The effect of the sediment in the South Fork Two Medicine River watershed (above private land) for *Alternative C2*, would be the difference between a 0.6% sediment increase over natural levels caused by existing roads and a 0.7% sediment increase over natural levels shown in Table 4.1 for Watershed 5 (See Section IV.1.B.). This estimate of the difference in sediment yield (approximately 0.1%) would be less than the level of accuracy available for estimating sediment yield, and much less than the year to year variation already occurring.

Alternatives F8 and F9 would not include enough surface disturbance for a reportable increase in sediment yield.

The percent of sediment yield increase would be much less than that estimated for the Hall Creek APD Environmental Assessment (BLM and Forest Service, 1985). The change from the Hall Creek EA is due to an improved model that provides better estimates with more realistic coefficients for sediment delivery. Also, new mitigation measures are included for the Fina Project, that were not in the Hall Creek EA. New mitigation measures would include complete road surfacing with gravel, and the use of slash filter windrows, for more effective control of sediment yield.

The estimated sediment yield increases for *alternatives A2, B2, C2, D1, F8, and F9* would be low, because only one access road would traverse any designated watershed. *Alternatives A2, B2, C2, and D1* would add some sediment downstream from private lands in the South Fork Two Medicine River drainage, with a much less impact than shown in Watershed 5 of Table 4.1 (See Section IV.1.B). Soil and Water Conservation Practices and State water quality standards would require control of sediment from road construction (See Section IV.1.B. for discussion on conservation practices).

For *alternatives A2, B2, C2, and D1*, much of the road construction mileage would be across soils (landtypes 22, 25C, and 177), composed of glacial till, with a mass failure hazard due to potential rotational slumping of earth or mud flows. The discussion on mass failure hazard in Section IV.1.B., would be applicable for these landtypes.

Careful road and well site location selection, could avoid most of the potential mass failure hazard areas. The use of slash filter windrows, sediment traps, and prompt revegetation should reduce the amount of sediment produced during construction activities. Estimates shown in Table 4.1 indicate that several times the amount of the estimated current sediment yield would have to occur before a measurable impact would be noticeable downstream.

The Best Management Practices discussed for the Chevron Project (Section IV.1.B) would be applicable for all alternatives on the Fina Project.

Mitigation measures available to reduce sediment yields, beyond required Best Management Practices, include the closure and restoration of old roads in the area, the use of lined diversions for culvert installations at live water crossings, and the use of rock riprap at culvert outlets.

b. Ground Water

The environmental effects on ground water resources that could result from the implementation of the various alternatives for the Fina Project are generally the same as discussed for the Chevron Project. Any effects that could occur to the ground water resource, by *alternatives A2, B2, C2, and D1* would occur in the South Fork Two Medicine River drainage. The same hazards would exist as discussed for the Chevron Project, and the same regulations would apply.

c. *Water use*

The effects that could occur from the use of water in conjunction with *alternative A2, B2, C2, D1, F8, and F9*, would be generally the same as discussed for the Chevron Project, and the effects would occur in the South Fork Two Medicine River drainage. The same hazards would exist, and the same regulations would apply.

Water use should not exceed 50 gallons per minute during drilling (Chevron, 1987). A well of this size would not constitute a measurable withdrawal from the available groundwater and would not be a pollution hazard to the groundwater. A Notice of Completion of Groundwater Development, filed with the Montana Department of Natural Resources and Conservation, would be required for the right to use water (up to 100 gallons per minute).

In the event well water was not available in adequate quantities at the drilling site, it is anticipated that Fina would seek an alternate water source. Sources of surface water could include the South Fork Two Medicine River. Water could also be obtained from water wells drilled on National Forest System lands or private lands within reasonable distance of the well site.

The amount of water needed for drilling the exploratory well, would cause *alternatives F8 and F9* to be costly, as the number of helicopter trips to fly in the needed water would be high.

Alternative E (no action) would cause no change, so there would be no effects.

Reasonably Foreseeable Actions

A Dry Hole

The effects of drilling a second hole would be similar to those described for the exploration proposal. Should Fina move to a new location to drill the second exploratory well, some additional loss of vegetation and ground disturbance would occur, with a slight increase in sedimentation. The increase in sediment yield would not be measurable.

One Well Production

a. *Surface Water*

For *alternatives A2, B2, C2, and D1*, sediment yield would be highest during the first one to two years following road construction, until the roadbed, cuts and fills stabilized. The yields in Table 4.1 include this increase. Following the first two years, sediment yields would stabilize, and could decrease.

Should a pipeline be constructed, the sediment yield would approximate that produced from road construction. In this case, crossing streams with a pipeline would be an unavoidable contributor to sedimentation. Sediment produced during pipeline construction could be controlled at stream crossings by providing drainage to sediment traps or filter areas. All areas with soil disturbed during pipeline construction would be revegetated.

For *alternatives F8 and F9*, it would be necessary to construct a pipeline and an access road, sediment yield would be the same as indicated for any of the roaded alternatives.

Risk of an oil spill would be a hazard to the local fishery, downstream irrigation, and domestic water supplies along the Two Medicine River. A contingency plan would be developed to reduce the hazard, and to provide a rapid response in the event a spill occurred.

Other effects and regulations would be similar to those discussed for the Chevron Project.

b. *Ground Water*

Pipeline ruptures could cause leakage of oil or oil products. Although the risk of a rupture is small, Fina would be required to clean-up any contaminated soils. A long-term effect of such a rupture could be groundwater contamination.

c. *Water Use*

No additional water use would be necessary.

A Field Production

a. *Surface Water*

The sediment yield would increase with additional access roads. The amount of this increase would depend upon the location of the roads across sensitive landtypes. Constructing roads across landtypes

25, 25C, and 171 could cause a sediment yield increase from erosion, and landtypes 22, 25C, and 177 could cause a sediment increase from slumping and cutbank failure. Pipeline construction and maintenance would add some additional sediment. The total estimated increase in sediment would not show any measurable increase above natural levels. Sediment production would decrease some after construction was completed. Some sediment would be produced until all disturbed areas were revegetated.

The transport of petroleum products would continue the risk of an accidental oil spill and the spill contingency plan would remain in effect.

Best Management Practices would be continued throughout the life of the field. The potential for surface or drill hole contamination from drilling or production activities would be additive with each additional well, though additional knowledge of subsurface hazards learned in the first well may allow for better protection in the development of additional wells.

b. *Ground Water*

The potential effects to ground water would be the same as discussed in Section IV.1.B.

c. *Water Use*

The effects from water use would be the same as discussed in Section IV.1.B.

C. AIR QUALITY

During the scoping process, four concerns were raised about the effects of the proposed activity on air quality. The four air quality concerns were:

1) What are the effects on air quality during road construction?
2) What are the effects of traffic and associated road dust?
3) What is the effect of emissions from burning slash or other materials?
4) What is the potential for and effects of hydrogen sulfide gas exposure during drilling?

This section of the analysis examines the possible effects on air quality, within and adjacent to the project area that would result if the project were carried out for the alternatives being considered. The effects from possible production are also considered. Mitigation measures, as applicable are included.

Exploration Proposal

a. Road Construction and Dust Considerations

Alternatives A2, B2, C2, and D1 would involve road construction through several geologic formations of mudstone and siltstone that would be prone to dust emissions from heavy vehicle use during the dry months. Fugitive dust and vehicle emissions would be expected to increase above present levels. A suitable surfacing material or other dust abatement measures (i.e. dust suppressing chemicals or watering) would be necessary to reduce the amount of dust in these areas. Control of vehicular speed could also reduce fugitive dust by 20-50% (Environmental Protection Agency, 1977). Road closures to all except project and administrative personnel would minimize traffic and the associated dust problems. Particulate levels would not be expected to be greater than those established by the Montana Department of Health and Environmental Sciences Air Quality Bureau.

Portions of these routes traverse stream valleys where dust and emissions may accumulate during periods of low winds. Dust could also accumulate in portions of streams where there is little or no vegetative screening from the road. The effects of dust and other sediment sources to the South Fork of the Two Medicine River are discussed in Section IV.2.B-Water Resources and Section IV.2.H-Fisheries.

Fina has indicated in their APD that drilling traffic would be about 20 vehicles per day with a crew camp near the drill site. If they do not have a crew camp, the number of vehicles would be greater, adding to any increase in particulate levels. Drilling activity would occur 24 hours a day with 3 shift changes.

Alternatives F8 and F9 would cause some localized increases in vehicle emissions and fugitive dust in conjunction with the staging areas due to drilling vehicle traffic and prop wash from the helicopter. There would be some emissions from numerous helicopter overflights, but wind levels for this area would likely dissipate most emissions at flight elevations.

b. *Emissions*

For *all the alternatives*, except *Alternative E (no action)*, emissions from drilling activities could be anticipated at the wellsite. These combustion emissions could include oxides of nitrogen, carbon, and sulfur. Drilling rigs of the type typically used in the Overthrust Belt are exempt from requiring a Prevention of Significant Deterioration (PSD) air quality permit under the Montana Air Quality Rules (16.8.1102k(ii)). This means that emissions from this source (particularly sulfur dioxide, in this case) would not exceed the national air quality standards.

Trash would either be incinerated daily or removed from the site. The amount and type of particulate matter emitted and the incineration vessel design shall comply with the Montana Department of Health and Environmental Sciences Standards.

c. *Hazardous Gases*

Much concern has been voiced by residents of East Glacier Park and neighboring communities regarding effects that a release of hazardous gas may have on the air quality in those areas. The wellsite is located approximately 7 miles to the southwest of East Glacier Park and prevailing winds in the vicinity are generally from the southwest. The topography surrounding the Fina site is moderately sloping toward the northeast.

All action alternatives would result in drilling and would present the possibility of hazardous gases, especially hydrogen sulfide, escaping to the surface. As described in Section IV.1.O (Chevron), a worst case blowout analysis was made. This analysis uses a concentration of 15% hydrogen sulfide by volume and worst case meteorological and blowout conditions. The analysis of such an extreme hydrogen sulfide blowout event indicated that, in a worst case situation, the hydrogen sulfide would exceed 300 ppm concentration for an area about a mile surrounding the drillsite. Beyond this distance, concentrations were predicted to be below 300 ppm, with dramatic decreases with any change in discharge or wind conditions. Even under this extreme event, significant hydrogen sulfide concentrations would not be anticipated near East Glacier Park or surrounding residences. This subject is discussed in more detail in Section IV.1.0.

Fina has prepared an hydrogen sulfide contingency plan for their proposed project (Appendix B) that outlines safety plans and emergency procedures for personnel and general public in the event of equipment failures or an overpressured formation containing hydrogen sulfide is encountered during drilling.

Alternative E (no action) would cause no change, and would create no effect from hazardous gases.

Reasonably Foreseeable Actions

A Dry Hole

The air quality effects due to road construction, dust, emissions and hazardous gases caused by drilling a second well, should the first hole prove to be dry, would be similar to those discussed for the exploration proposal. Any effects would be extended for the period of time required to drill the second well. Mitigation and monitoring measures would be in effect throughout the operation, similar to the exploration proposal.

A One Well Production

Under *alternatives A2, B2, C2 and D1*, the effects on air quality from road construction and dust generation would decrease upon completion of road and well pad construction. Should any road be left open for travel by the general public, emissions and dust generated by more frequent road use could continue at a level similar to that during drilling. Dust would be generated during construction of any pipeline for transport of the well production, with effects similar to road construction. These effects would also decrease upon completion of construction. Revegetation will stabilize disturbed areas and help control dust. If hydrocarbons are transported from the wellsite by truck, dust abatement measures would be required during dry months.

Under *Alternatives F8 and F9*, it would be necessary to construct a road and pipeline as discussed for the access road alternatives. The effects would be similar to those discussed for the roaded alternatives.

Emissions would probably not change significantly from exploration drilling conditions. Additional emissions will be generated during any further construction, however, emissions associated with the drill rig would be gone. Emissions would occur from periodic well visits once construction is completed and the well is producing.

There would be the possibility of gas emissions from ruptured pipelines or poor pipe fittings. Fina has submitted a Plan of Operations in the advent of a project well, outlining equipment needs and a production scenario for the one well. Because of the extreme toxicity of hydrogen sulfide, the wellhead would be monitored and controlled from a remote facility and periodic site visits will occur. These site visits will also include service trips, which would be minimized. If the access road to the well site remains closed to public use, dust emissions and other particulate matter should be reduced.

Particulates from incineration at the site should be less than during exploration drilling.

Any effects from hazardous gases would be the same as discussed in Section IV.1.C. Any proposal for a gas sweetening plant in the study area would require further environmental analysis.

A Field Production

The amount of road construction and dust generated would be dependent on the distance between wellsites. Dust levels would be expected to increase in the areas of road construction during construction phases. Most of the road constructed for the one well scenario would probably be utilized for access to additional wells. Dust would decrease upon completion of construction. Mitigation measures as outlined for construction and dust abatement in the exploration proposal would be in effect throughout the life of the wells.

Emissions from drilling activity and field production could be occurring at the same time. These combustion emissions are not expected to exceed air quality standards. Trash would either be incinerated daily or removed to an approved disposal facility. Allowable levels of particulate emissions and the design of an incineration vessel would comply with the standards of the Montana Department of Health and Environmental Sciences.

During development of the field, the possible effects of hazardous gases would remain a risk, similar to those discussed for the exploration proposal and one well. The risk of an accidental blowout would continue until all wells have been plugged. The potential effect of additional wells on the local communities would be dependent on their locations. The hydrogen sulfide contingency plan and standard precautionary measures for blowout prevention would continue until all drilling had been completed. Hazardous gases are discussed more thoroughly in Section IV.1.O-Health and Safety.

D. ACCESS MANAGEMENT AND RECLAMATION

Several concerns were expressed during the scoping process of this analysis regarding road building activities. These concerns include:

1. How will the additional access be managed to accommodate other resources and uses besides the oil and gas activities?
2. How and what areas of disturbance will be reclaimed following completion of the project?

This section discusses the current road and trail systems in the RM-1 Unit, the effects that each alternative would have on the road and trail system if implemented, and the reclamation requirements for the various alternatives following completion of the drilling project. Table 4.13 provides a summary of how the various alternatives relate to the existing road and trail system in the RM-1 Unit. Map 3.5 shows the location of the existing roads and trails discussed in this section.

Exploration Proposal

a. Management Direction

The Lewis and Clark National Forest Plan (Forest Service, 1986a) provides the guidelines for road management in the RM-1 Unit. This is discussed in detail in Section IV.1.D.a.

Roaded *alternatives A2, B2, C2 and D1* would provide access into portions of the RM-1 Unit not presently available to vehicle travel. Road use restrictions identified in Chapter V would apply to all roads constructed or reconstructed for oil and gas exploration drilling. Helicopter *alternatives F8 and F9*, and *alternative E* would result in no change in road management strategy.

b. Effects on the State/Reservation Transportation System

Alternatives A2, B2, C2 and F8 enter and exit the RM-1 Unit via US Highway 2. The increase in traffic volume during project activity would have little or no effect on the existing traffic using US Highway 2 (current traffic volumes of 800 to 1,000 vehicles per day). Some type of warning sign could become necessary to warn users of US Highway 2 of increases in the number of vehicles entering and exiting the highway.

Under *Alternatives D1 and F9*, project related traffic would enter and exit the project area via the Bureau of Indian Affairs (BIA) road system. These routes require crossing the Blackfeet Reservation. BIA 2 and the Dog Gun Lake Road (also called Hyde Creek-Deep Creek Road 3334 on National Forest Transportation System) are public roads available to access National Forest lands. These routes are subject, however, to user requirements specified by the Bureau of Indian Affairs. The increase in traffic volume during drilling should not affect the present traffic flows on BIA 2. Design standards on BIA 2 are more than adequate to accommodate the additional traffic. The Dog Gun Lake road would have to be reconstructed between its intersection with BIA 2 and the Forest Boundary. Sections of the Dog Gun Lake road would require substantial reconstruction. Reconstruction would be to standards specified in section IV.1.D.b for BIA Road 141.

c. Effects on the National Forest Transportation System

The miles of road construction and reconstruction that are identified for each alternative are described in Table 4.13. For *alternative A2*, 0.3 miles of Ridge Road 9223 would be reconstructed and 5.7 miles of road would be new construction. For *alternative B2*, 5.9 miles of new construction from US Highway 2 would be needed to access the proposed drilling site. Under *alternative C2*, 1.5 miles of the Pike Creek Road 8958 would be reconstructed and 5.1 miles of additional road would be new construction. For *alternative D1*, 2.9 miles of the Dog Gun Lake road would be reconstructed and 8.2 miles of new road construction would be needed to access the proposed drill site. All construction and reconstruction would be to standards specified in Section IV.1.D.c. Roads for *alternatives A2 and D1* would cross private lands at the forest boundary. The United States holds access right-of-way through these properties. Road construction and reconstruction would provide improved access to the properties and could also increase access to the National Forest. Specific road use control measures would be required to minimize adverse effects created by increased road use. Road control measures to be imposed are discussed in Chapter V. The effects of road closures or restrictions on outdoor recreation are discussed in Section IV.2.J. The effects of road closures and restrictions on Blackfeet Tribal members is discussed in Sections IV.1.M and IV.2.M.

For helicopter *alternative F8*, approximately 1 mile of road would be constructed. This road would be along a portion of the route proposed for alternative B2. For *alternative F9*, no new or reconstructed road would be needed on Forest Service lands, however, 5.4 miles of existing road between BIA Road 2 and the Palookaville staging area would require reconstruction.

With the exception of alternative 9, some new construction would be required for all alternatives. The Surface Operating Standards for Oil and Gas Exploration and Development (Forest Service and BLM, 1989), contains design criteria and considerations for new roads constructed for oil and gas activity. In general, oil and gas exploration roads must be designed to accommodate the use of heavy, extended length "low boy" type vehicles to transport disassembled drill rigs. Use during adverse weather conditions would also require surfacing materials to minimize sedimentation and erosion and provide for a safe roadway during slippery conditions. Specific design criteria are discussed in Section IV.1.D.

Table 4.13
Fina Project
Summary Of Road Access Effects On Trails And Mitigation Options

Alt.	Alternative Access Proposal	Effects on Existing Trails	Mitigation Options
A2	0.3 miles of Ridge Road 9223 would be reconstructed through private land to the South Fork Two Medicine River bridge.	No effects on trails.	
	5.7 miles of new construction would be required from the South Fork Two Medicine River bridge to drilling site.	Would provide vehicle access to some private lands presently without vehicle access	Use of access across private lands would depend upon landowner's desires.
		Would obliterate approximately first mile of 4 wheel drive (4wd) Trail 101.	Relocate the first mile of 4wd Trail 101
		Would cross Trail 118 in one location	Relocate approximately 1 mile of Trail 118 to avoid trail crossing.
B2	5.9 miles of new construction between US highway 2 and drilling site would be required.	Would cross Two Medicine Elk Calf Mountain NRT 133 in 3 locations.	Relocate 1 mile of NRT 133 to avoid 2 crossings. One crossing can not be avoided.
		Would obliterate approximately 1 mile of unnumbered trail east of Two Medicine River bridge.	No mitigation required.
		Would obliterate Summitt Cutoff Trail 133Y from US Highway 2 to the South Fork of Two Medicine crossing.	Avoid trail encroachment to the extent possible.

Alt.	Alternative Access Proposal	Effects on Existing Trails	Mitigation Options
C2	1.5 miles of Pike Creek Road 8958 would be reconstructed.	No effects on trails.	
	5.1 miles of new construction between Pike Creek Road 8958 and the drilling site would be required.	Would cross Two Medicine-Elk Calf Mountain NRT 133 in 2 locations before So. Fk. Two Medicine River bridge.	Relocate one half mile of NRT 133 to avoid 1 trail crossing. One crossing can not be avoided.
		Would cross 4wd Trail 101 near Two Medicine River Bridge.	Crossing of 4wd Trail 101 can not be avoided.
		Would cross the the snowmobile loop Trail 134 between Summit Campground and the Two Medicine crossing.	Crossing can not be avoided.
		Would obliterate approximately 1 mile of unnumbered trail east of Two Medicine River bridge.	No mitigation required.
D1	2.9 miles of the Dog Gun Lake road between BIA Road 2 and Forest Boundary to be reconstructed.	No effects on trails.	
	8.2 miles of new construction from Forest Boundary to drilling site would be required.	Would cross and obliterate approximately 3/4 mile of Trail 180.	Relocate approximately 3/4 mile of Trail 180 that would be obliterated and/or crossed by access road.
		Would cross near the junction of Trails 172 and 180.	Avoid the junction, or relocate the junction.
		Would cross Trails 139, 140, and 172 at least once.	Crossings can not be avoided.
F8	Approx. 1 mile of access road from US Highway 2 to helicopter staging area would be constructed.	Helicopter flights would cross 4wd Trail 101 and unnumbered 4wd trail.	No mitigation is required.
F9	5.4 miles of existing road between BIA Road 2 and the Palookaville staging area would be reconstructed.	Helicopter flights could be seen and heard by users of Trails 139, 140, 172, and 180.	Effects of sight and sound from helicopter flights can not be avoided.

d. Effects on the Forest Trail System

Effects of roaded access on individual trails, and trail mitigation, including trail relocation and project avoidance, is summarized in Table 4.13. *Alternatives A2, B2, and C2* would have the greatest impacts on existing public access routes due to trails being overlain by road and crossings of trails by roads. Some temporary road closures or restrictions may also occur during the road construction phase which would affect users who access trails on those roads. Conflicts between trail users and drilling traffic associated with these alternatives could require that certain roads and trails also be closed to public use during the drilling period.

For *alternative A2*, the first mile of 4wd Trail 101 would be obliterated and Trail 118 would be crossed once. The trail obliteration and crossing could be avoided by relocating the roadway. New road construction would also provide vehicle access to some private lands. How the access is controlled would depend on the landowners' desires.

Alternative B2 would cross the Two Medicine-Elk Calf Mountain National Recreation Trail in 3 locations and would obliterate about 2 miles of trails. Two crossings and some trail encroachment may be avoided by mitigation.

Alternative C2 would cross trails (one is a snowmobile trail) in 4 locations and would obliterate 1 mile of trail east of the South Fork Two Medicine bridge. Three of the four crossings would be unavoidable by trail relocations and the obliterated would not be mitigated because it is a 4-wheel drive trail.

Alternative D1 would cross trails in 5 locations and would obliterate about 3/4 mile of Trail 180. Three trail crossings would be unavoidable and the remaining two may be mitigated by trail relocation.

The road for *alternative F8* would cross two 4wd trails which would require no relocation. *Alternative F9* would cause no physical disturbance to any trails within the Forest trail system.

The Lewis and Clark National Forest Travel Plan provides for regulation of public use during mineral exploration activity (Forest Service, 1988). Effects of road access on recreationists and other trail users is discussed in more depth in Section IV.2.J.

e. Reclamation

Reclamation requirements for the Fina project would be similar to those discussed for the Chevron project. These are discussed in Section IV.1.D.e.

Reasonably Foreseeable Actions

A Dry Hole

Drilling a second well, should the exploratory hole prove dry, would have no additional effects on the Forest transportation system other than to extend use of the area and roads for a longer period of time. Effects on local trails would depend on the location of the second well and the permitted operating season.

A One Well Production

For *alternatives A2, B2, and C2*, the volume of oil and gas related traffic entering and exiting US Highway 2 would decrease from that needed for the exploratory drilling operation. Should production from the well be trucked from the area, instead of piped, truck traffic would continue to enter and leave US Highway

2. Any hazard warning used during drilling to alert users of US Highway 2, would also be of benefit while the well was in production.

For *alternative D1*, traffic volumes should be less than for the exploration proposal. Should production from the well be trucked rather than piped, truck traffic would continue throughout the life of the well. However, no cumulative effects on roads and trails are anticipated. For *alternatives F8 and F9* , it would be necessary to construct an access road to the well site along one of the roaded alternative alignments. Road construction and use would be similar to that described for the roaded alternatives. Effects on trails would also be similar.

If a pipeline was to be constructed, it would likely be located parallel to the road. Upon completion of construction activity, the volume of oil and gas related traffic would diminish to one or two vehicles per day, and could be considerably less (possibly 1 to 5 vehicles per month for remote monitoring the well site).

> Most of the effects to the trail system would have occurred in association with the proposed drilling activity. Production from the well would prolong the duration of activity and use of access roads to the well site. This may necessitate relocation or realignment of certain trails to conform to long-term management strategies for the RM-1 Unit. Use of new roads by the public is not anticipated during the period of operation except where specifically authorized. This is discussed in detail in Section IV.3.

Reclamation requirements would not be completed until production from the well was finished. It is likely that the reclamation practices required for the exploration proposal would also be implemented for reclamation of production related facilities.

A Field Production

Foreseeable actions and effects of field production discussed for the Chevron project would also apply to the Fina proposal. Refer to Section IV.1.D for additional discussion.

E. GLACIER NATIONAL PARK AND ADJACENT WILDERNESS

An issue was raised through the scoping process about what would be the effects of the proposed project activity on Glacier National Park and the adjacent wildernesses. This section discusses the environmental effects that would result from implementation of the various alternatives in terms of air quality, noise, natural vegetation, visual change, wildlife and related ecological values because of the proximity of the proposed activity to wilderness and national park areas.

Fina's proposed exploration well site would be located approximately 2.7 miles southeast of the southern boundary of Glacier National Park, approximately seven miles to the northeast of the Great Bear Wilderness and 17 miles to the north of the Bob Marshall Wilderness at their closest points (Map 1.2).

Exploration Proposal

a. Air Quality

Air quality effects anticipated during exploration drilling are discussed at length in Section IV.1.C. As described in Section IV.1.C., the most likely sources of air quality degradation would be a well blowout, exhaust from vehicle engines, and/or fugitive dust from roads, staging areas, and the drill site.

A well blowout, although not likely, could release contaminants, including hydrogen sulfide, dissolved salts, and dust into the ambient air in substantial quantities. Once airborne, these materials would either disperse into the atmosphere or concentrate near the source area depending on the prevailing local climatic and meteorologic conditions. Under the locally windy conditions that are characteristic along this area of the Continental Divide, one would expect the gaseous materials to disperse into the atmosphere and migrate downwind--in a direction away from the National Park and Wildernesses. Under quiet air conditions, the heavier airborne contaminants would tend to disperse and migrate to the lower elevations--possibly in the lower drainages of Hall Creek, Box Creek, and the South Fork Two Medicine River.

Blowout contaminants are unlikely to concentrate in low areas in Glacier Park and the Wildernesses, due to differences in elevation (higher), and due to prevailing upper level winds. Under these conditions, the proposed project and the access alternatives would not be expected to affect air quality values of wilderness and other Class I areas, and should not exceed State and Federal ambient air quality standards for these areas. No degradation of visibility is expected for the Class I areas.

Dust and vehicle emissions during dry months would result from implementation of those alternatives that require road construction and/or use, and helicopter flights. Dust and helicopter and vehicle emissions could accrue along roaded access corridors during periods of heavy use--i.e., during the actual drilling period. This particulate matter could migrate to the Park boundary under certain climatic conditions (conditions that would cause the dust and emissions to drift northward). Such amounts would likely be insignificant and undetectable to the Park visitors. Airborne contamination would disappear once the drilling operation ceased or as weather conditions made dust creation unlikely. Gravelling, wetting the roadway, or other dust control measures during such seasonally dry periods would eliminate a large portion of the road dust. Helicopter and vehicle emissions would be present during the drilling period, but should be considerably less than automobile, truck and railroad emissions along US Highway 2.

Alternatives D1, and F9 would result in very little or no effect on these special areas because they are in a downwind direction and approach the site from the east.

b. Vegetation

The effects of airborne contaminants on vegetation in Glacier National Park and adjacent wildernesses from the drilling operation would be similar to those discussed in Section IV.1.E.

c. Wildlife

Alternatives A2 and B2 would have little effect on wildlife migration, as most of the migration occurs west of these routes. Activities associated with *Alternative C2* would have the potential to disrupt animal migration east of Summit. This route bisects the wildlife migration corridor. Effects of the proposed activity on migration corridors is discussed in Section IV.2.G.

Alternative F8 could have the greatest potential to disrupt wildlife migration, due to the activity of helicopters in the Summit area.

With *alternative D1 and F9*, there would be no effect upon the migration routes.

The documented migration corridor east of False Summit would not be affected by any of the alternatives. Effects on wildlife migration between the Park and RM-1 Unit is discussed in greater detail in Chapter IV.2.G.

d. Visual

Visual effects are discussed in Section IV.2.K. There should be very little visual effect of oil and gas activity from viewers in either Glacier National Park or the Bob Marshall and Great Bear Wildernesses. Views up the South Fork of the Two Medicine drainage are possible from segments of the Autumn Creek Trail in Glacier Park. However, vegetative and topographic screening prevents views into most of the study area. Careful selection of route locations, reduced clearing, and revegetation could be mitigation measures to reduce visual impacts.

Although it is possible that *alternatives A2, B2, C2, and D1* may be visible from certain areas within Glacier National Park, these alternatives would be located at distances beyond US Highway 2 and the Burlington Northern Railway. Any visual effects would be subordinate to the Highway and railroad.

Lights on the drill rig would be visible at night from portions of the Park facing US Highway 2, extending the area of visible lights beyond that of the railroad, US Highway 2, and local residences.

Following the drilling activity, and no gas or oil was encountered, all project roads would be reclaimed as prescribed in the Lewis and Clark National Forest Plan (Forest Service, 1986a, Management Standard F-3). Any visual discord would be a short-term effect. Reclamation options are discussed in Appendix K. Under all alternatives, newly constructed roads would be returned to a natural-like condition. Revegetation would immediately follow; however, it would take many years--perhaps decades for the revegetated areas to blend in with the undisturbed vegetation.

Views of the project area from the Bob Marshall and Great Bear Wildernesses into the project area would be unlikely due to terrain and vegetation blockages and distance from the project area to the wildernesses.

e. *Water*

Any effects would be the same as discussed in Section IV.1.E.

f. *Noise*

The proposed drill site is located approximately 2.75 miles from the Glacier National Park boundary. The noise of the drilling rig could be audible to Park users. Some noise, from construction and use of access roads, and from helicopter operations near the Park, could carry over into the Park. These noises would be in addition to the noises that currently occur along the US Highway 2 corridor. Road construction noise in the lower segments of the South Fork Two Medicine drainage would be of most concern for Park visitors.

Alternatives B2, and C2 would provide the greatest amount of short-term noise to Park users because construction would proceed directly from US Highway 2.

Alternative A2 could provide some background noise during bridge and road construction. This activity would not occur within one mile of the Park boundary, except for some road reconstruction activity on the Pike Creek Road. Construction and use of roads under *alternatives A2, B2, and C2* would add to the common sounds already occurring along the Park Boundary. Such sounds originate from highway traffic, trains, and heavy equipment operating on public and private lands between the Park Boundary and the study area. Noise effects from all the alternatives during construction would occur only during the daytime, whereas the noise created by highway traffic and the railroad traffic occurs throughout the 24 hours.

Alternative F8 would generate the most noise for Glacier National Park users. Under this alternative, there would be short-term noise from constructing a helicopter staging area and service road. The most significant effect on Park users should be while helicopters transported drilling rig components and equipment to and from the drill site at the beginning and completion of the operation. Smaller helicopters would be used on a continuous basis during the drilling period to ferry workers and supplies to and from the drilling area.

The helicopter generated sounds would be obvious to Park users because, they are distinctly different in character from the other sounds that are common within and along the Park's southern boundary. This is discussed in more detail in Section IV.1.E.

Alternatives D1 and F9 should not pose any undesirable noise effects on Glacier National Park.

The noise effects on the Bob Marshall and Great Bear Wildernesses would be similar to that of Glacier National Park with two exceptions: (1) no activity would occur within 3 to 4 miles of the wilderness boundaries, thus reducing any noise effects to background levels, and (2) sounds should be heard from only the high elevations along the Continental Divide. Sounds from the drill site would likely be shielded from the Divide by the Two Medicine Ridge and vegetation. It is also possible that helicopter noise would be screened by the Two Medicine Ridge.

Alternative E (no action) would cause no change, so there would be no effects.

Reasonably Foreseeable Actions

A Dry Hole

Exploration of another well would not create any additional effects other than to extend activity for additional seasons. If the drill rig for a second well could not be screened from National Park users, a change to the landscape would be apparent during the drilling period.

A One Well Production

The air quality effects of possible production from one well are discussed in Section IV.2.C. Should a pipeline be needed to transport petroleum products from the well site, additional fugitive dust and helicopter and vehicle emission would occur, similar to those discussed for construction activities for the exploration proposal. These effects would occur seasonally and should not result in any cumulative effects to Glacier National Park or wildernesses. Airborne contaminants from operation of the one well should not encroach on either the Park or Wilderness areas because of the prevailing wind directions. Potential effects of an uncontrolled release of hazardous gases are discussed in Section IV.2.O-Health and Safety.

Effects on wildlife are discussed in Section IV.2.G.

Should a pipeline be required, the construction activity near US Highway 2 would be visible from those portions of the Park located immediately north of the Highway and the Burlington Railroad. Effects on the visual resource would be similar to those discussed for the exploration proposal, however, any visual discord would remain for the life of the well and until reclamation has been completed.

There would be some additional noise during the construction of any pipeline. The construction noise should be similar to that discussed for the exploration proposal. *Alternative F8 and F9* would cause the greatest adverse effect on Park users. In addition to noise from helicopter use during the drilling operation, there would be sounds associated with construction of an access road and pipeline to serve the well site. This period of disturbance could extend for a period of 5 years or longer.

Other sources of noise related to oil and gas production would be the same as discussed in Section IV.1.E. The noise from pumps and compressor stations could be reduced by locating such facilities farther from the Park boundary or using effective muffling systems. It is unlikely that noises from production activities would extend to the wilderness boundaries for the reasons discussed above.

A Field Production

The effects on air quality from a long term field would be the same as those discussed in IV.1.E.

The effects on wildlife are discussed in Section IV.2.G.

There may be some opportunity to view portions of a well field from high ridgelines of both the Park and Wilderness areas. The viewpoints affording views into the study area are few and any views would be dependent on the location of the additional wells, roads, and pipeline. The visual effect from any portion of the Park or Wilderness areas should be small, but anything that is viewed would have a cumulative effect on the visual landscape for the life of the field and until reclamation has been completed.

The sounds associated with development of a field were discussed in Section IV.1.E. Some sounds from field production could reach the Park from the vicinity of the well site. Locating facilities behind ridges and using effective muffling systems should reduce the sounds to background levels. It is unlikely that noises from production activities would extend to the wilderness boundaries due to the Two Medicine Ridge.

F. BADGER-TWO MEDICINE ROADLESS AREA

All of the alternatives being considered for the Fina Project would be located outside the roadless area (see Map 3.6). Lands within the RARE II Inventoried Roadless Area 1-485 would not be affected by the exploration proposal or reasonably foreseeable actions resulting from the exploration activity.

G. WILDLIFE

The major concerns expressed by the public for the Chevron project also apply to the Fina project. These concerns are the effects of the proposed activity on threatened and endangered species (grizzly bear, grey wolf, peregrine falcon, bald eagle) and big game and other species (elk, moose, bighorn sheep, goat, deer, black bear, furbearers, and nongame species).

The effects of implementing the various exploration alternatives for the Fina well site are discussed below in the context of their effect on individual wildlife species. Mitigation measures that would be needed to minimize the effects on wildlife habitats for any of the action alternatives are discussed for individual species. Figures 4.14 -4.19 illustrate the number of acres of seasonal range that would be impacted for the individual species if a *yearlong* window of operation was utilized.

1. Threatened and Endangered Species

Detailed information on threatened and endangered species is discussed in the biological evaluation in Appendix F. The following discussion is a summary of the biological evaluation. Two scenarios will be discussed: 1) exploration proposal/ dry hole, in which 1-2 wells are drilled and then reclaimed because of no presence of hydrocarbons, and 2) production scenario of a one/three well field.

Exploration Proposal

a. *Grizzly Bear*

The effects of the proposed activity on grizzly bears may be direct, indirect, cumulative, short term or long term. The direct impacts to grizzly bear from actual loss of acres of habitat from ground disturbance will be minimal (less than 100 acres) and will not be the focus of discussion. The major impacts to grizzly bear habitat will be short term and of direct nature from the stand point of displacement from preferred areas, the potential for increased mortality and the potential for introducing attractants which may result in bear-human conflicts.

There is the potential of long-term impacts if either or both of the wells are producers. This is discussed under the One Well and Field Production scenarios. Selection of the no action alternative will have no impacts on grizzly bear habitat from gas and oil exploration. The following discussion will pertain to the action alternatives.

The Rocky Mountain Front Cumulative Effects Model (Forest Service et.al., 1987) which compares the amount of seasonal ranges affected by the proposals, and research data compiled by Keith Aune, Montana Department of Fish, Wildlife and Parks during the Rocky Mountain Front research project, were the main tools used to evaluate the impacts of the proposed wells on grizzly bear habitat. Cumulative effects analysis was completed for all alternatives of the proposed project.

The cumulative effects model creates two outputs to measure the effect of activities on the grizzly bear. These outputs are habitat effectiveness and mortality risk index. Yearlong, unmitigated habitat effectiveness values range from 79.29% to 81.88% during the spring season, 74.68% to 76.91% for the summer season summer, and 68.38% to 70.62% for the fall season (Figures 4.12). Mortality risk index values are also very similar for all the alternatives, including the no action and helicopter alternatives. Mortality risk index values range from .047 to .052 for the spring season, from .109 to .114 for the summer season and from .202 to .208 for the fall season (Figure 4.13). A comparison of the outputs for all the alternatives, including the helicopter and no action alternatives, indicates that all the alternatives have a similar impact to grizzly bear habitat during the exploration phase of the project. Helicopter *alternatives F8 and F9* would reduce the habitat effectiveness less than the roaded alternatives.

Seasonal ranges disturbed by the Fina alternatives include spring range and denning habitat. Spring range acres disturbed varies from 3,416 acres (*alternative A2*) to 7,007 acres (*alternative 9*). Denning habitat acres disturbed would range from 100 to 260 acres which is insignificant when compared to the amount that is available for use (Figures 4.18 and 4.19).

In order to compare habitat quality for each alternative, a seasonal habitat value rating (SHV) for the alternatives zone-of-influence (ZI) was calculated. Using this value, *alternative A2* has the highest seasonal habitat value of all the alternatives. This means that *alternative A2* impacts a higher quality of habitat than other alternatives. However, because it has the smallest zone-of-influence, the reduction in habitat effectiveness is the lowest. *Alternative B2* is very similar to alternative A2. *Alternative D1* has the lowest habitat quality ratings but has the largest reduction in habitat effectiveness. This is because of the large zone-of-influence that is created due to the greatest number of miles of road associated with this alternative. Thus, of the roaded alternatives, *alternatives A2 and B2* would be the least impacting to grizzly bear habitat. Both would result in a bridge crossing of the South Fork Two Medicine River. If the bridge is left in place, there could be a long-term change in the recreation use pattern in the area. Presently there is very little use within the area during the spring months because of high water and the problems associated with crossing the river. If a bridge is constructed and left in place, then this natural barrier would be breached and an increase of use of the area by recreationists could be anticipated.

The selection of any of the alternatives would result in a "may effect" situation for the grizzly bear. This is based on the temporary displacement of the bear from preferred areas, reduction in habitat effectiveness, and the increase in the mortality risk index.

b. Gray Wolf

Implementation of the no action alternative would allow the present activities to take place without superimposing any additional oil and gas exploration activities.

Selection of any of the Fina Alternatives will not impact any habitat components such as den sites or rendezvous sites since none are known to exist. The potential for indirect effects in the form of mortality to the wolf and it's prey species is much greater. The wolf prey base that exists in the area are elk, moose, deer, small game and beaver.

Implementation of *all Fina alternatives* with the exception of *alternative D1* would have minimal impacts on any of the prey species for the wolf. Even if yearlong operation was to occur, very little of the key winter range for elk and moose would be disturbed. With the use of timing restrictions and road closures, the minimal impacts could be reduced to almost zero.

Implementation of *alternative D1* has the potential to affect the prey base and thus affect the wolf. However, because there are no wolf packs in the area at the present time and the impact from the exploration phase would be short term under this scenario, there would be minimal impacts on the wolf with this alternative if a timing window was used that restricted drilling outside the winter range season.

The selection of any of the alternatives will result in a "no effect" situation for the wolf. This is based on the short term impacts during the exploration phase, the absence of an established wolf pack, and minimum disturbance to the prey base.

c. Bald Eagle and Peregrine Falcon

All alternatives for both projects will have very little effect on existing or potential habitat for either species. The only potential effect would be that of the encroachment on the riparian habitat at the crossing of the South Fork of the Two Medicine by either project in the vicinity of Sawmill Flats. However, there are no known eagle nest sites or communal roost sites along this portion of the river.

There are no known falcon eyries, historic or present, that would be affected by any of the alternatives that are being considered, therefore; a "no effect" conclusion has been determined for these two species.

Reasonably Foreseeable Actions

A Dry Hole

Refer to discussion under Exploration Proposal.

A One Well Production

Under a production scenario, a roaded access would be required. Therefore, if a helicopter alternative was the preferred alternative, a road access would be constructed at this point. The effects of the road construction on wildlife would be those as discussed for the individual roaded alternatives.

a. Grizzly Bear

If production facilities are located at False Summit, *alternative A2* would be selected for the access route for the well and pipeline. There would be about 3,400 acres or 7.6% of the grizzly bear spring range within the zone-of-influence of the road to the well and result in an average habitat effectiveness of 76.24% (see Appendix F). This would provide an access route to the well that is more along the periphery of the elk winter range and the grizzly bear spring range. It is also adjacent to the private lands and their activities. Production of the well would require leaving the bridge across the South Fork Two Medicine river intact to facilitate visitation to the well head and pipeline corridor. This road and bridge would be regulated for motorized use by the public in accordance with the Forest Travel Plan. Administrative traffic would be permitted for the inspections necessary for the well head. Because of the presence of the bridge across the River on a legal public access, there could be an increase in nonmotorized use of the area over what is presently taking place because of the problem of crossing the River at high water.

If production facilities were to be located at Sawmill Flats with *alternative B2*, there would be about 3,500 acres or 7.9% of the grizzly bear spring range within the zone-of-influence of the road to the well and would result in an average habitat effectiveness of 76.11% (see Appendix F). Sawmill Flats lies in the bottom

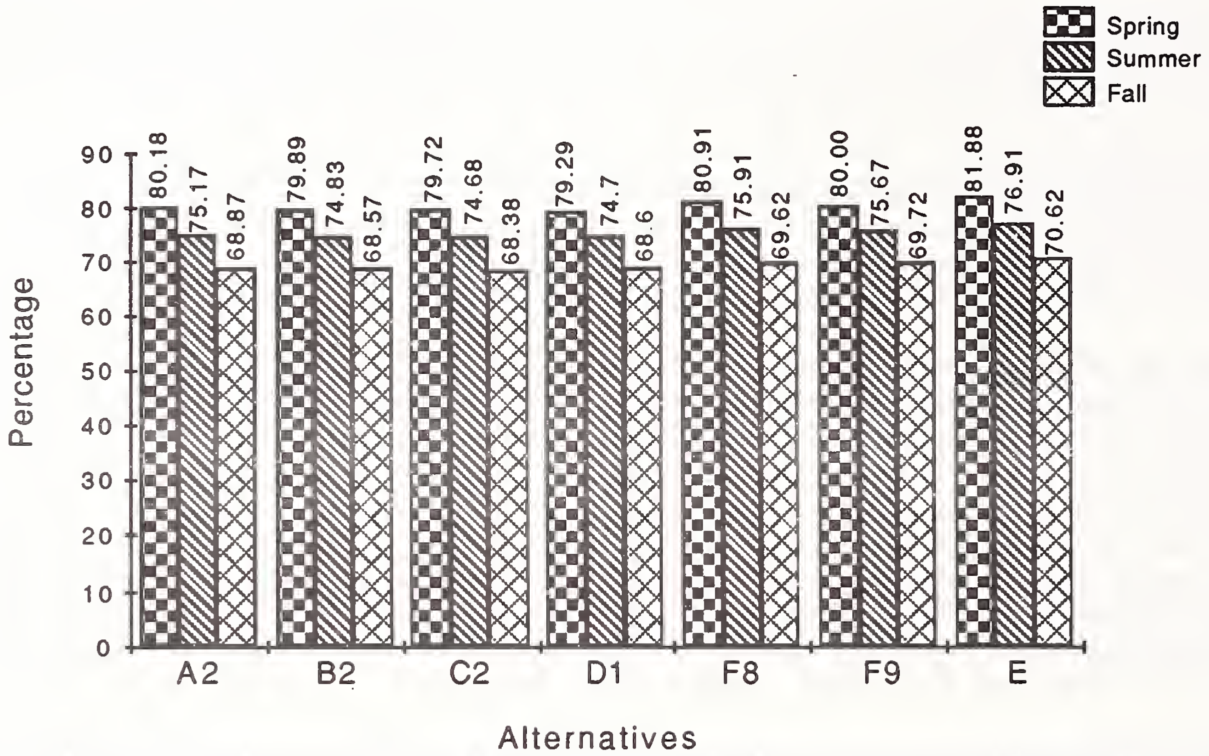


FIGURE 4.12 Grizzly Bear Habitat Effectiveness By Alternative

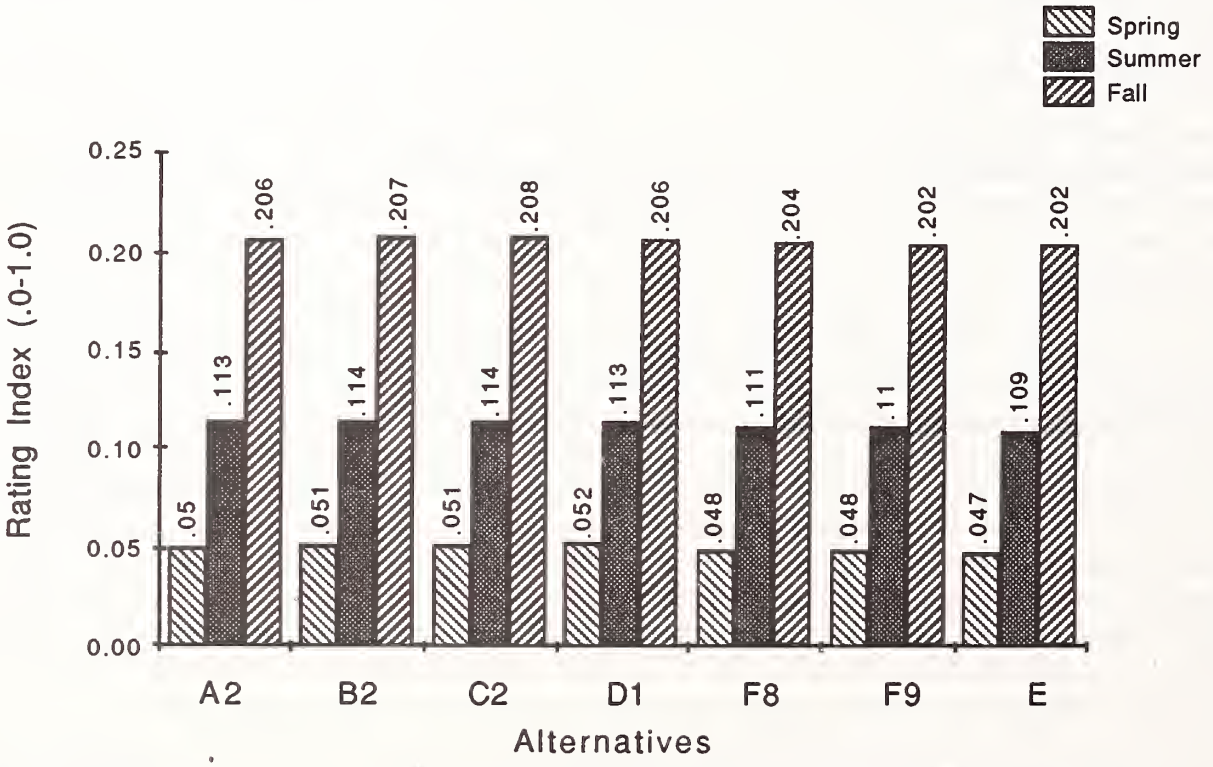


FIGURE 4.13 Grizzly Bear Mortality Risk Index By Alternative

of the South Fork Two Medicine River and is on the south side of the river requiring the bridge to be left in tact. This facility would have traffic to and from it daily or at least weekly. This would be an additional disturbance that is not present at the current time.

If production facilities were located on the Blackfeet Reservation east of Dog Gun Lake and *alternative D1* was selected for the access to the well site, about 6,400 acres or 14.2% of the grizzly bear spring range would be within the zone-of-influence of the road and would result in an average habitat effectiveness of 76.77% (see Appendix F). These same acres are involved with the Hyde, Box, and Hall Creek elk and moose winter range unit. It would also improve access up Deep Creek and into the head of Metler Coulee which is a key area for the elk to winter if the snow depths become very deep. This is also where the most of the illegal taking of elk takes place in the late winter and early spring. Therefore, by improving access into this area and allowing some visitation to the well site, it is anticipated that there would be a greater impact to the wintering elk and moose as well as additional disturbance to the grizzly bear spring range that is not currently taking place.

All routes for production have very similar effects on habitat effectiveness and the mortality risk index. *Alternative A2* would impact a slightly higher quality habitat than than *Alternatives B2, C2 or D1.*

b. Gray Wolf

The basic impacts that have been discussed under the exploration phase would carry forth to the production scenario. However, instead of the impacts being short term, they now become long term and have the potential to impact the wolf to a greater degree depending on which access alternative is selected and the location of the production facilities.

If production facilities are located at False Summit, *alternative A2* would be selected for the access route for the well and pipeline. There would be minimal impacts to any of the prey species for the wolf because the access road would not be crossing any of the key winter ranges of wolf prey but would be on their periphery. If all facilities were located at False Summit, there would be much less need for well head visitation. The bridge required to cross the South Fork Two Medicine River and the access road would be managed for public travel in accordance with the Forest Travel Plan. With these conditions for the production of the Fina well site, minimal impacts would result to the wolf.

If production facilities were to be located at Sawmill Flats, and *alternative B2* was chosen, there would be the potential for more impacts to the prey base, the moose. Sawmill Flats lies in the bottom of the South Fork Two Medicine River and is on the south side of the river requiring a bridge to be left intact. This facility would be within moose winter range and would have traffic to and from it daily or at least weekly. This could result in mortality to moose and possibly to the wolf itself because of the increased and easy access provided by the road and bridge.

If production facilities were located on the Blackfeet Reservation east of Dog Gone Lake and *alternative D1* was selected for the access to the well site, some impacts to the elk and moose prey base could be anticipated. Alternative D1 passes through the Hyde, Box, and Hall Creek winter range unit. It would also improve access up Deep Creek and into the head of Metler Coulee which is a key area for the elk to winter if the snow depths become very deep. This is also where the most of the illegal taking of elk takes place in the late winter and early spring. Therefore, by improving access into this area and allowing some visitation to the well site, it is anticipated that there would be a greater impact to the prey base and to the wolf.

c. Peregrine Falcon

Refer to discussion under "Exploration Proposal".

A Field Production

This scenario would be similar to the "One Well Production" above. Additional acres of disturbance would occur with each additional well and any corresponding production facilities. The activity may also occur over a greater period of time, until all the wells were abandoned and reclaimed. The high level of activity that occurs during drilling would continue for a longer period of time until all the wells have been brought into production phase. It is anticipated that daily visits to well sites would occur until a history of production was established. Remote monitoring and fewer visits may then be feasible. Remote monitoring is discussed in detail in Section IV.1.A.

2. Big Game Species and Other Wildlife

Effects on big game species would result primarily from road construction and use. The noise associated with the helicopter access alternatives could also be a significant factor affecting behavior of big game species. In addition, increased roaded access may result in more hunting pressure. These factors, and the concern that migration routes would be affected, are discussed as follows.

Exploration Proposal

a. Elk

As previously stated in the discussion for the Chevron Project (Section IV.1.G.), one of the greatest impacts on elk would be the loss of habitat due to displacement along the roads constructed and used as prescribed for *alternatives A2, B2, C2, and D1.*

Elk calving habitat and elk winter range would be traversed with all four road alternatives. The most used areas (key) of the winter range, and the calving area is in the vicinity of Hall, Box, Hyde Creeks and Mettler Coulee. Because of this, *alternatives A2, B2, and C2* would be the least impacting of the Fina alternatives (see Fig 4.14). These routes would pass through the northwestern border of the ranges and would be on the fringes of the seasonal ranges.

Alternative D1 would pass through the upper portions of the drainages involved and at higher elevations than the key winter range. Alternative D1 would have impacts similar to alternatives A2, B2, and C2 in the calving area and the winter range, especially in the area where the proposed access road for *alternative D1* traverses Deep Creek and drops into the head of Mettler Coulee and Hyde Creek. The large, open windswept ridges in this area receive elk use during the winter as well as in spring during the calving season.

Telemetry data supports the mapping of the seasonal ranges. There appears to be a segment of the elk population that spends the entire year in the Hyde, Box, and Hall Creek area, with just elevational movements, while another segment of the population migrates to the drainages near the continental divide to calve and summer. *Alternative D1* would also bisect this migration route over the Two Medicine Ridge into the upper elevations of Woods Creek, and into the tributaries of the South Fork Two Medicine River.

Alternatives F8 and F9 staging areas would be in the same areas as discussed for the Chevron Project (Section IV.1.G.). The impacts incurred for Fina would be similar to the impacts discussed for the Chevron Project, with a difference of acres of seasonal ranges being impacted do to the well placement for Fina (Figures 4.14 and 4.15).

Migration corridors between Glacier National Park and the RM-1 Unit would be impacted by *alternatives B2 and C2* to the same extent as with the Chevron alternatives 1A, 1B, 6A, 6B, 7A and 7B.

The impacts to elk habitat with this scenario are short term at most and would cease once the well had been drilled and the well site and access route had been reclaimed (2-3 years). During the operation of the permit, impacts could be mitigated by imposing timing windows and travel restrictions to the public as specified in the Rocky Mountain Front Guidelines (Chp.V-Mitigation and Monitoring-Wildlife).

An increased harvest through both legal and illegal means could result from increased roading of the area (Section IV.1.G.). Because of the high illegal mortality on radio collared elk (as discussed in Chapter III. G), it can be assumed that any increase in uncontrolled access could increase illegal mortality. Elk utilize most of the RM-1 Unit. They are widely dispersed during the summer-fall months, and become more concentrated during the winter-spring period in the vicinity of Hall, Box and Hyde Creek winter range. In addition to the increased concentration, the animals would be more easily observed due to the open grassland comprising these areas. Elk become more vulnerable to illegal mortality in this vicinity than in other parts of the RM-1 Unit.

b. Moose

Impacts to the moose and its habitat would be similar to the impacts discussed for the Chevron Project (Section IV.1.G.). All road alternatives and the well site would be located within moose winter range and impact about the same amount of acres (Figures 4.16 and 4.17). *Alternative F8* would impact the greatest number of acres of moose summer range and *alternative A2* would impact the fewest number of acres of moose summer range. *Alternative F8* would also impact the greatest number of acres of moose winter range while *alternative A2* would impact the fewest number of acres of moose winter range. As with the Chevron well site, the largest impact to the moose would due to increased access and the potential increase of illegal hunting.

c. Mountain Goat

Goat habitat would not be impacted by the Fina proposal.

d. Black Bear and Deer

Impacts to the black bear and deer would be similar to the discussions for the Chevron Project (Section IV.1.G.).

e. Other Wildlife Species

The effects on all other species would be similar to the Chevron Project (Section IV.1.G.).

f. Impacts to Migration Corridor Between GNP and the RM-1 Unit

A general discussion related to the migration of wildlife between the National Forest System lands and Glacier National Park can be found in Section IV.1.G.

g. Summary of Acres Impacted and Possible Windows for Operation

Figures 4.14-4.19 display the acres for the seasonal ranges involving the species of concern, and also the percent of the seasonal ranges that would be affected in relation to the habitat available in the RM-1 Unit. This is the acreage that would be impacted under the various alternatives if Fina were allowed to operate under a *yearlong* operating window. The effect of implementing mitigation measures was not included in these figures. Without wildlife mitigation, the loss of habitat, as shown in Table 4.14, could adversely affect the wildlife populations that the Rocky Mountain Front Guidelines were designed to protect. On the other hand, with total adherence to the Guidelines, a minimum drilling period would exist. An alternative to these options would be to analyze various levels of wildlife protection against various timing constraints placed on the drilling project. By restricting operations to "windows" (periods when drilling would be allowed), drilling would occur at times least critical to wildlife needs. Table 4.14 compares the acres impacted by the various alternatives with no mitigation and the acres impacted using various "operating windows" that could be created by applying different guidelines for mitigation for wildlife. If all mitigation guidelines that are identified in the Rocky Mountain Front Guidelines were used (except denning restrictions), as shown in Table 3.3, there would be a 5-month window available to allow the actual drilling of the well at its present location.

The 9-month window shows impacts within the entire zone of influence of the road on seasonal ranges because of the overlap of moose and elk winter range and elk calving range. The only difference between the no mitigation window and the 9-month window would be that activity would not occur during the calving season and grizzly bear spring season. There would not be any activity in the vicinity of the well or road corridor (for alternative D1 only) when the elk began to migrate across the Two Medicine Ridge into the upper drainages of the South Fork Two Medicine River for their summer range. As referenced in Section IV.1.G., roads of this type do not block migration of elk. This is also demonstrated elsewhere on the Rocky Mountain Front during migration of elk to and from the Sun River Game Range.

Table 4.14
Acres of Wildlife Seasonal Ranges Impacted with and without Mitigation

ALTERNATIVES

	A2	B2	C2	D1	F8	F9
No Mitigation[1]	3,586	3,716	4,386	5,286	7,720	4,520
5.0 Month Window[2] (July 1-Nov 30)	200	600	1,200	710	1,800	150
9.0 Month Window[3] (July 1-Apr 1)	3,426	3,716	4,386	5,286	7,720	4,520

[1] Includes all seasonal ranges listed in Figures 4.14-4.19

[2] Includes elk and moose summer range, and grizzly bear denning habitat

[3] Includes elk and moose summer and winter range, and grizzly bear denning habitat.

If operations were restricted to protect winter and spring wildlife habitat, a 5-month window (between July 1 - November 30) would be available. If operations were restricted to protect wildlife during grizzly and black bear spring season, and elk calving season, a 9-month window could be available (from July 1 - April 1) within which to drill. This would impact portions of elk and moose winter and summer range.

As with the Chevron proposal, the amount of acres disturbed by the helicopter alternatives would be very close to the roaded alternatives. The advantage of a helicopter alternative over a roaded alternative with respect to wildlife, would be no road development into a roadless area, and the legal and illegal taking of wildlife species would be greatly reduced as well as the need for administration of any roadway.

In order to minimize the effects to key wildlife seasonal ranges (grizzly bear spring range, elk and moose winter range and calving range) and allow Fina to explore their lease, an operation window of 5 months and additional trail closures are recommended (see Chapter V and Appendix F). With the implementation of

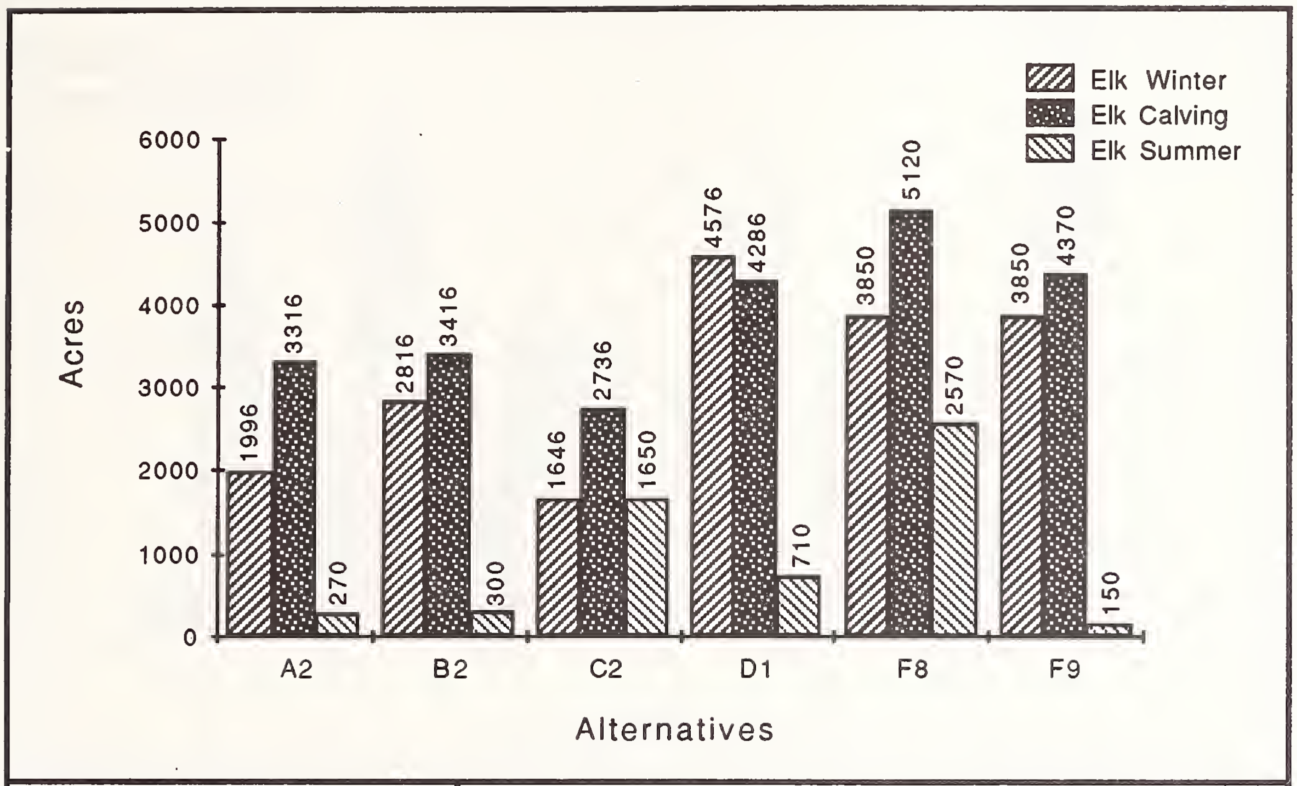


FIGURE 4.14 Acres of Seasonal Elk Ranges Affected

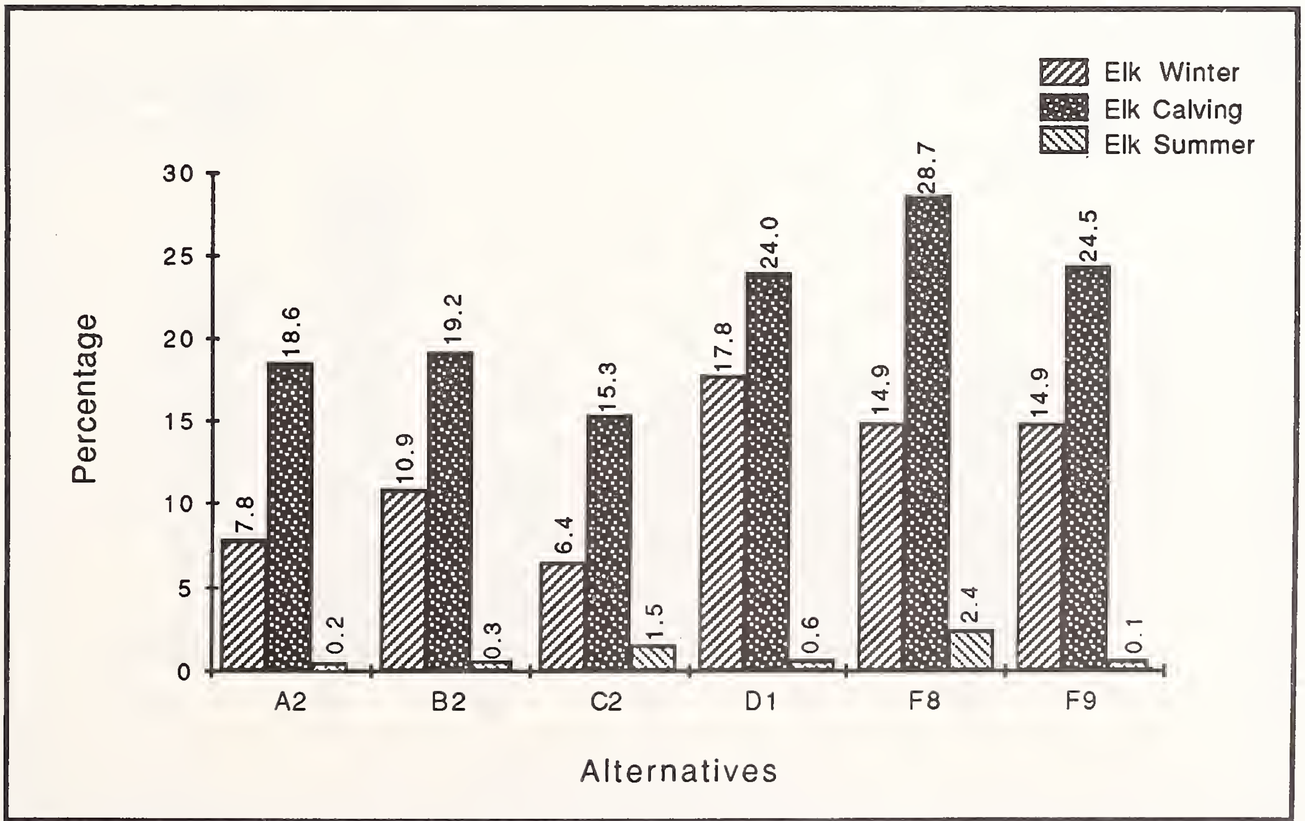


FIGURE 4.15 Percentage of Seasonal Elk Ranges Affected

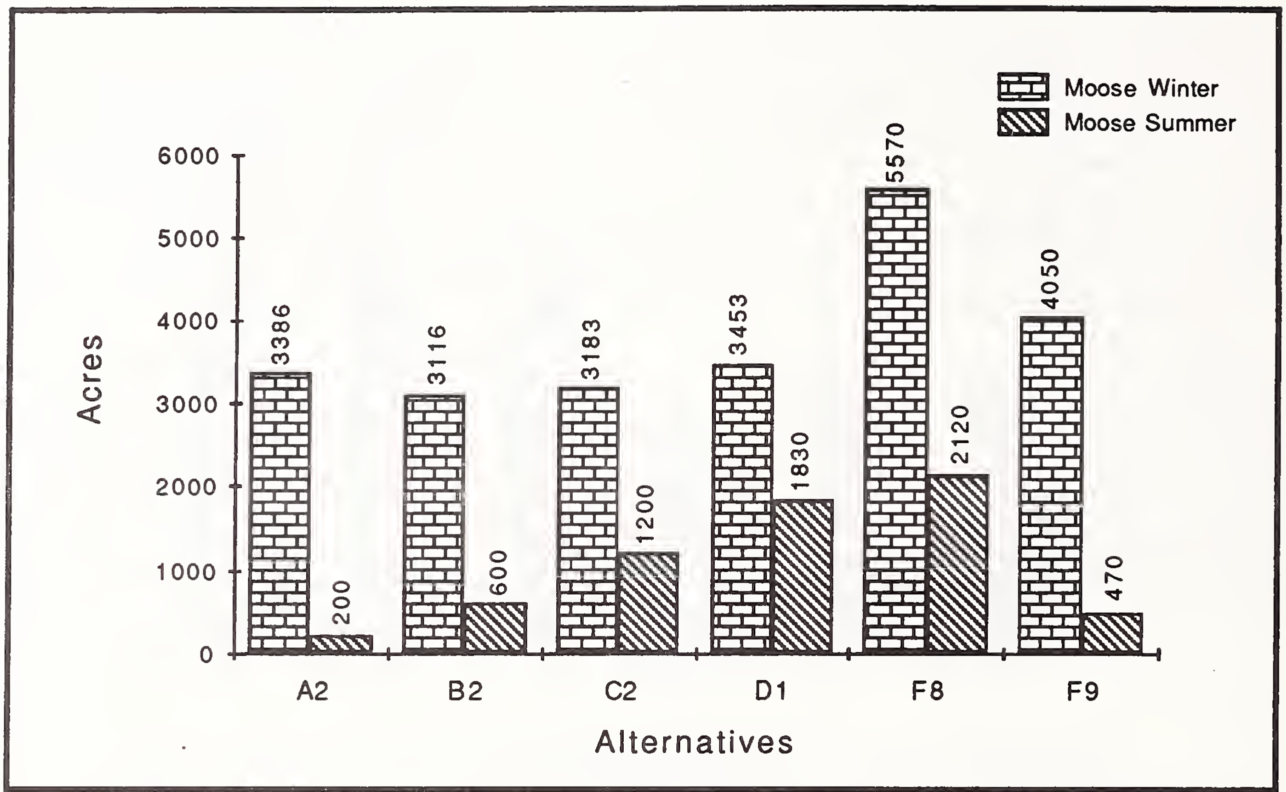


FIGURE 4.16 Acres of Seasonal Moose Ranges Affected

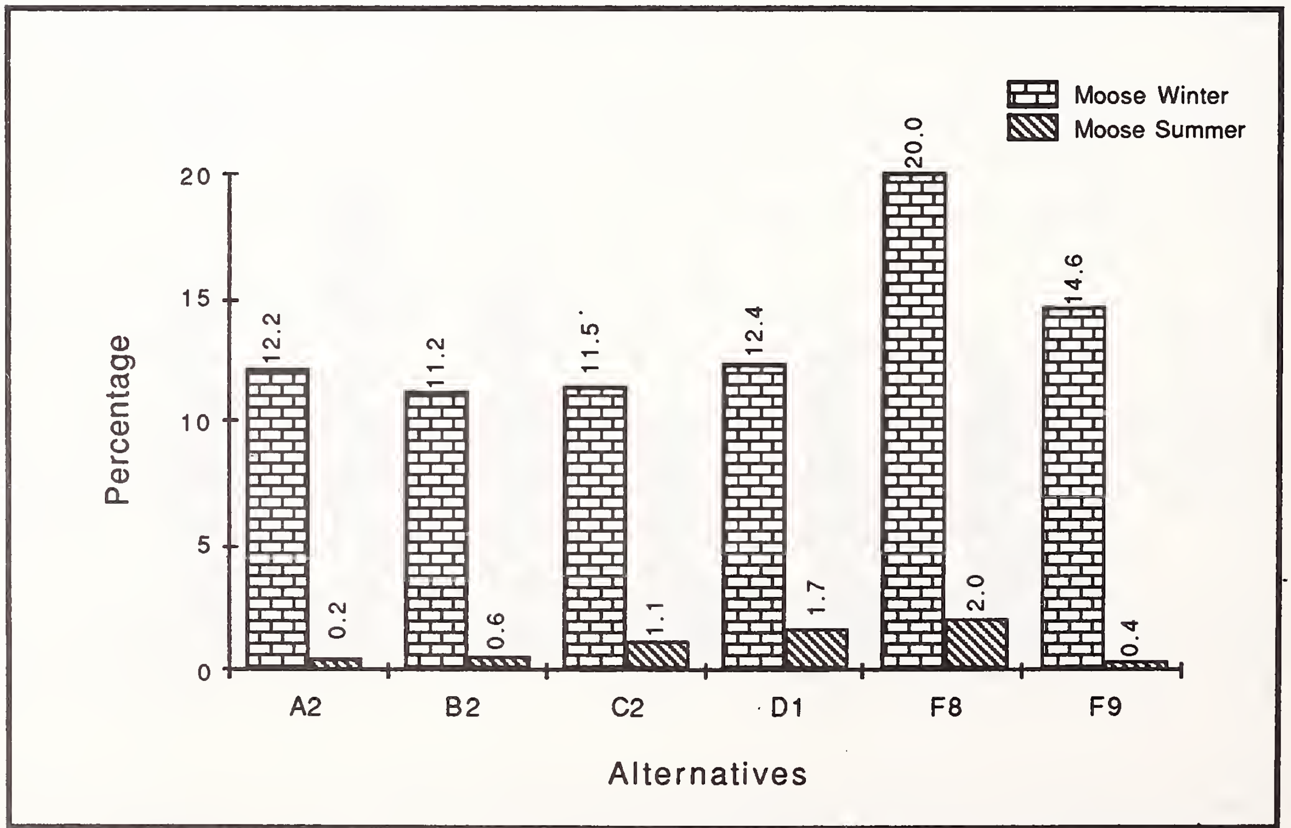


FIGURE 4.17 Percentage of Seasonal Moose Ranges Affected

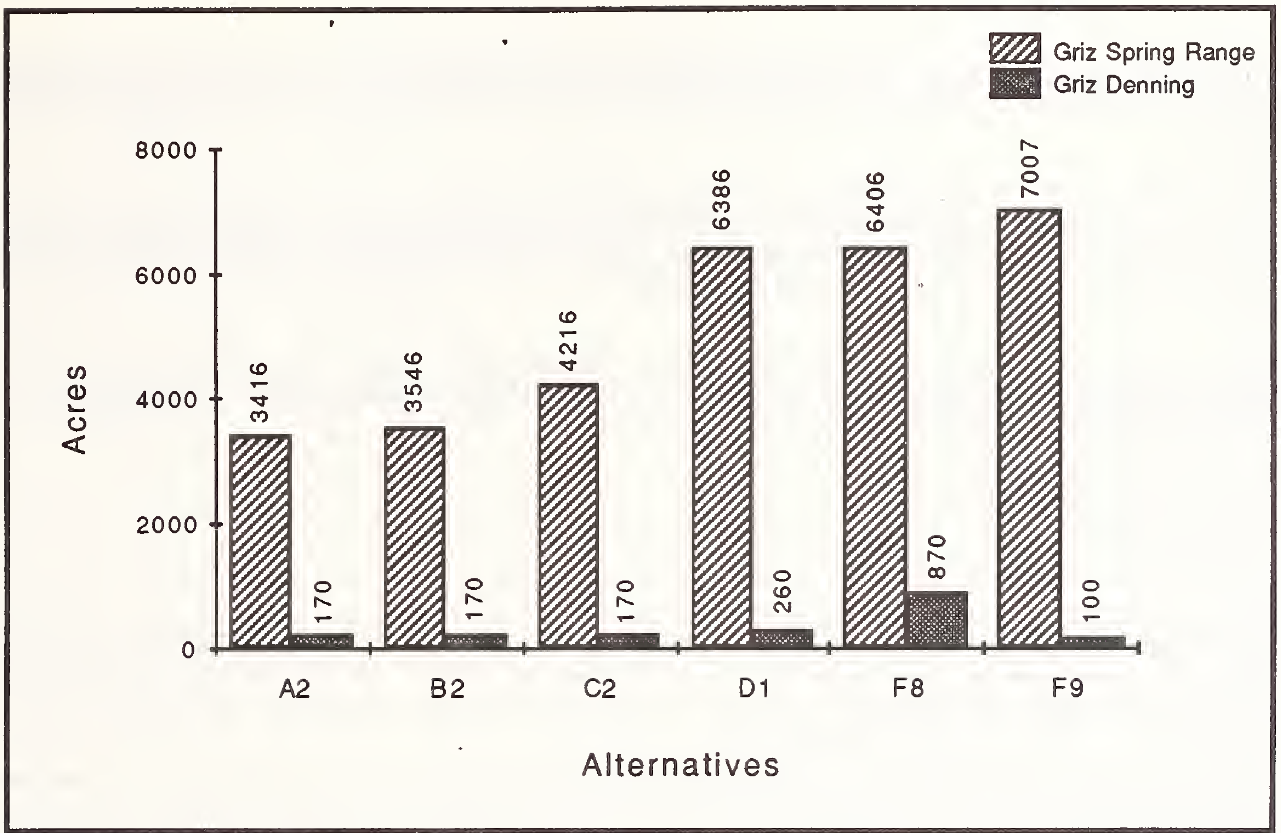


FIGURE 4.18 Acres of Seasonal Grizzly Bear Ranges Affected

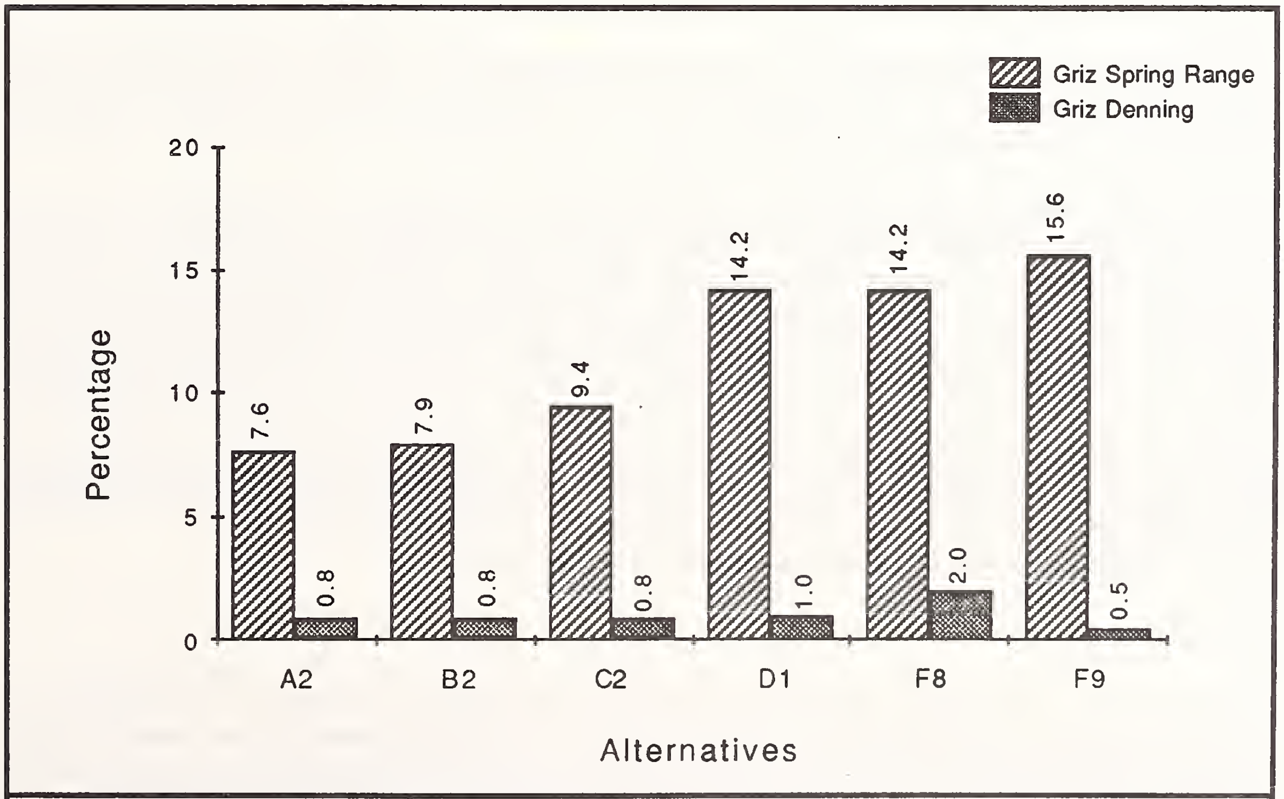


FIGURE 4.19 Percentage of Seasonal Grizzly Bear Ranges Affected

this window, the effects on wildlife seasonal ranges can be reduced by a range of 68-97%. Of the roaded *alternatives A2* has the least effect on wildlife seasonal ranges and *alternative F9* has the least effect of all the alternatives.

The use of a road guard to monitor road use to company and agency personnel would reduce the mortality risk to all species in the form of illegal taking. It would also minimize disturbance along the road corridor during the night time hours (see Chapter IV and Appendix F).

Because of the closeness of the well site to US Highway 2 and the recommendations in the Biological Evaluation (Appendix F) to reduce the possibility of a human/bear conflict, it is recommended that there be no crew camp for any action alternative.

Reasonably Foreseeable Actions

A Dry Hole

The effects of drilling a second well would impact some additional acres, depending on whether a road alternative was selected, and also location of the well site. The major impact would be one of longer duration to complete the drilling. It is anticipated that the drilling would take place within a year or two after the first well was drilled. This would mean that reclamation of the road, well site, and bridge would not take place right after drilling of the first well. There would be at least one more season needed to complete the drilling of a second well and possibly two. The same mitigation measures would apply for the second hole.

A One Well Production

The three major species that would be impacted under a one well production scenario would be elk, moose, and grizzly bear (see section a. grizzly bear under Threatened and Endangered Species). The impacts discussed here will only relate to elk and moose.

The largest impact to these species would result from increased, and ease of access to the area and how that access relates to legal and illegal harvest of these species. It is beneficial to restrict public access into elk habitat during critical times of the year, such as during hunting season, winter, and spring calving.

To measure the quantifiable impacts to habitat in relation to production, an assumption needs to be made about where the production facilities would be located. The facility siting report has established areas suitable for location of these facilities. If the site were located on private land adjacent to US Highway 2, *alternatives A2 and B2* would best serve as access routes into the field. If the production facilities were located on the Blackfeet Reservation, then *alternative D1* would be the most logical access route into the field. The acres impacted by the zone of influence created by the road alternatives would be the same as during the exploratory phase. However, the actual amount of disturbance associated with vehicle travel on these roads after production facilities were in place should be considerably less. Telemetry monitoring of the well heads and seasonal restrictions on the roads could further mitigate impacts to wildlife habitat. It is anticipated that the displacement impacts, due to well head visitation, would not increase over the existing situation of recreation and livestock use of the area.

A Field Production

The effects would be similar to those discussed for the exploration proposal and the one well production scenarios. Control of public access, and the amount of access allowed for other uses could lessen the impacts of field production. These impacts could be lessened by imposing restrictions on the number of visits by oil companies, use of telemetry monitoring methods of the wellhead and pipeline, restriction of recreational use on the road during critical wildlife seasons, and coordinating law enforcement of the area by all responsible agencies.

Construction of pipelines would have impacts similar to road construction. The impacts would be short-term and limited to the period of construction activity. Once the pipelines were built and the sites reclaimed, the grass/forb and/or shrub habitat that would be created would once again become habitat to species requiring these elements.

Should all gas and condensate be pumped away from all well heads and stored at production facilities, it is anticipated that impacts would be minimal. It is doubtful that there would be much more of a disturbance factor during the summer and fall months to wildlife than already exists because of the current recreation and livestock activities taking place in the area. There could be an increase of activity during the winter over what is currently taking place. If the production facilities were located to the north on private lands, access *alternatives A2 and B2* would be the most logical. This would cause the least amount of disturbance to the winter ranges and because of the present snowmobile use in the area, it is anticipated that disturbance do to well head visitations would be similar to the present recreation disturbance. With *alternative D1* there would be additional disturbance on the winter ranges that does not exist today.

H. FISHERIES

Public concern about fisheries appeared to be less with the Fina project than the Chevron project because few comments were received regarding fisheries. Water quality was specifically mentioned in some public comments. However, to fully address impacts to the fisheries resource, the same items that were discussed for the Chevron Project are addressed for the Fina Project. The concerns included:

1) Siltation effects on spawning fish,
2) Injury and mortality to fish from diversion structures
3) Road crossings and impoundments,
4) The downstream effects on fisheries of the Two Medicine River, and
5) The effect of hydrogen sulfide on fish.

This section describes how trout populations and certain trout habitat components (spawning and rearing substrates in the streams) could be affected by implementing an action alternative for the Fina well. The degree of effect on habitat and the trout population are discussed in terms of the following factors: 1) increases in sediment delivery to streams due to road construction (exploration and production phases), 2) potential for hydrocarbon spills and pipeline rupture (production phase), 3) increases in fishing pressure associated with improved access into the analysis area (exploration and production phases), and 4) effects of hydrogen sulfide.

Mitigation measures, when applicable, are also discussed. No discussion of reductions in fish passage capability and the resulting injury or mortality is included, as fish passage would be provided for on all fishery streams.

Exploration Proposal

a. Sedimentation Effects

Alternatives A2, B2, C2, and D1 would result in less than a two percent increase in sediment delivery to the South Fork Two Medicine River and its tributaries. For the same reasons discussed under the Chevron Project (Section IV.1.H), no reductions in fish populations would be expected.

Alternatives F8 and F9 should cause little or no increase in sediment delivery to streams within the analysis area because of the limited amount of road construction.

Mitigation measures (Best Management Practices) could be used to reduce sediment production and delivery from roads by 20 to 80 percent, depending on the type and intensity of Best Management Practices which are used. It should be noted that even with implementation of Best Management Practices it is possible that enough sediment delivery could occur into the South Fork Two Medicine River and its tributaries to negatively affect the spawning and rearing habitats for fish. This situation could result from an extensive amount of roading and an unusual storm and runoff event. However, it is estimated that sediment delivery to the South Fork Two Medicine River would have to increase by 75 percent over current levels for a 10 percent reduction in the rearing habitat of cutthroat trout (Stowell et. al., 1983).

b. Effects of Increased Access

Discussion for the Chevron Project (Section IV.1.H.) is also appropriate here. The only stream affected by the Fina proposal that could be subjected to increased fishing pressure would be the South Fork Two Medicine River. *Alternatives A2, B2, or C2* would result in an increase in fishing pressure due to increased access. *Alternative D1* would result in no increases in fishing pressure because it does not increase access on streams likely to be extensively fished.

Mitigation measures that would restrict public access on any new roads would maintain fishing pressure at or near existing levels. Refer to Chapter V.Mitigation and Monitoring-Access Management, for specifics on access regulation options.

c. Potential Effects of Oil Spills or Pipeline Rupture, and Hydrogen Sulfide on water quality

The effects of an hydrocarbon release on the fisheries are discussed under the production scenarios.

Alternative E (no action) would result in no change to the current condition, so there would be no impacts to fisheries.

Reasonably Foreseeable Actions

A Dry Hole

The effects of project activity on the fisheries would be similar to that described for the exploration proposal, except the duration of the project would be longer. It is expected that Fina would drill their second hole in a different location from the first. This would cause additional surface disturbance, however, it would probably not cause a measurable increase in sedimentation if portions of the road for the first well were used. Reclamation procedures would be initiated for the first well upon plugging and abandoning. An environmental analysis would be completed prior to any approval for drilling a second well.

A One Well Production

a. Sedimentation Effects

Sedimentation effects would be similar to those for the exploration proposal, but would occur for a longer period of time. Increases in sediment delivery to streams of more than 1 percent over what is projected for exploration alone, would not be expected to occur as a result of the one well production. No reduction in fish numbers or measurable reduction in fish habitat would be expected to occur. The reasons for the estimated lack of impact are those as described under the Chevron Project (Section IV.1.H). In the case of the Fina project, sediment increases of 75 percent or more would have to occur before a 10 percent reduction in fish habitat capability would be expected.

Alternatives F8 and F9 would require a road access to produce from the well. The access would probably be one of the roaded alternatives herein analyzed. Thus, any sedimentation effects of these alternatives would be those discussed above for the roaded alternatives with similar effects and for a longer period of time. Increases in sedimentation of more than one percent would not be expected.

b. Effects of Increased Access

See discussion under A field Production.

c. Potential Effects of Spills or Pipeline Ruptures

The discussion of potential for hydrocarbon spills, risks to fish habitat and pipeline ruptures in the Chevron section (Section IV.1.H.) is also appropriate here. Fina *alternatives A2, B2 and C2* would have the highest risk of hydrocarbon delivery to the surface water because they all have one major crossing of the South Fork Two Medicine River, and the same crossing on Hall Creek. A pipeline route along the access corridor would pose additional risk to the fisheries in the Fina project area. The ramifications of a pipeline corridor in the vicinity of a stream are discussed in Section IV.1.H.

Alternative D1, along the Deep Creek drainage, would have a high potential for hydrocarbon delivery to streams from a vehicle accident or pipeline rupture because it traverses many small tributaries.

Potential effects of spills or pipeline ruptures for *alternatives F8 and F9* would be those described for the roaded alternatives since production would require a road access.

A Field Production

a. Sedimentation Effects

Impacts discussed for the one well production would also apply to the field production. The sediment production and delivery to streams resulting from this additional activity would result from increased access. This effect would occur for the life of the field until reclamation has been established. The estimated increases in sediment delivery are not expected to affect the fisheries resource in the project area over the life of the field.

Alternatives F8 and F9 would have impacts similar to those discussed for the one well, and exploration proposal.

b. Effects of Increased Access

See discussion under the Chevron project Section IV.1.H.

Alternatives A2, B2 and C2 would result in improved access to the upper reaches of the South Fork Two Medicine River during the exploration phase. Any effect, if access is not restricted, will occur over an extended period of time and could result in a substantial reduction in fish numbers. *Alternative D1* would result in improved access to the Deep Creek area which could result in a reduction of fish numbers over a period of time.

Fishing pressure could be reduced by mitigation measures. These measures include restricting access to all persons except project and administrative personnel from any roads constructed for the project activities and any roads currently unavailable for motorized use year-round (Chapter V-Mitigation and Monitoring). It could become necessary to implement more restrictive fishing regulations.

c. Potential Effects of Oil Spills or Pipeline Rupture

Effects of any oil spill or pipeline rupture would be similar to that described for the one well production. With development of a field, the risk of an oil spill or pipeline rupture would exist for a longer period of time.

I. VEGETATION

This section discusses the potential impacts to native plant communities which could occur if this project were approved. Five issues and concerns were identified during the scoping process. These are: (1) Direct, mechanical damage to existing vegetation, (2) Impacts resulting from chemicals that could be introduced, (3) Potential for encouraging the spread of noxious weeds, (4) Impacts to plants listed as rare or endangered, and (5) Potential impacts to livestock grazing, and impact to the permittees presently grazing the project area.

Mitigation measures that would be needed to minimize the effects are discussed, as applicable.

Exploration Proposal

a. Loss of Existing Vegetation

Removal of existing vegetation would occur during construction activities on proposed roads, and clearing for the drill site and staging areas. Disturbance of adjacent vegetation could occur to a lesser degree during the use of these areas by vehicles and large equipment. Using mapped landtypes for the RM-1 Unit (Holdorf, 1981), the proposed disturbance activities have been estimated in terms of approximate acres by alternative for each of six current vegetation groupings. These are listed in Table 4.15. Existing roads requiring reconstruction should not involve significant new clearing or the potential for additional loss of existing vegetation.

Alternatives A1, B2, C2, and D1 could be expected to have a potential vegetation loss of 25 to 38 acres. The effects would be similar in terms of the amount of physical disturbance that would result from implementation of any of these alternatives. The removal of existing vegetation from open and closed lodgepole pine mixed species forests, and some grasslands represents a very small percentage of what is now existing in the area. The vegetation loss should not threaten the relative abundance or geographical range of plant or tree species occurring in the area. Impacts to the vegetative communities would be the physical removal of vegetation from specific sites. Vegetation in the roadbed would be completely removed. Vegetation adjacent to the road may be damaged somewhat by dust and emissions.

A minimal acreage of wetlands and gravel bars would be affected by each alternative. This area would be adjacent to the South Fork Two Medicine River for *alternatives B2, and C2*. These access routes would cross the river bottom in one location and would not affect a large area (Table 4.15). Any activity occurring in wetland or floodplain areas would be regulated by Executive Orders 11988 and 11990 (May 24, 1977), which set forth direction and responsibility for agencies in reducing the risk of adverse impacts to these sensitive areas.

Table 4.15

Fina Project
Estimated Acres of Vegetation Removed or Disturbed

					Acres of Disturbance by Vegetative Type						
	Road Acres*		Drill Pad	Staging	Closed Forest		Open Forest				
Alt	Re-const	New Const	Acres	Acres	LPP[1]	LPP[2]	LPP [3]	[4]	Grasslands[5]	Wetlands[6]	Total
A2	4.2	16.6	4		14.1	4.4	6.3				24.8
B2	0.0	22.6	4		19.6	4.4	1.3			1.3	26.6
C2	4.2	19.1	4		10.9	14	1.2			1.2	27.3
D1	0.0	34.0	4		10.7	13.1	14.2				38.0
F8			7**	3**							10
F9			7**	3**							10
E											0

[1] Includes lodgepole pine(LPP)/Douglas fir types with a beargrass understory.

[2] Includes lodgepole pine/Englemann spruce/subalpine fir types with menzesia or vaccinium dominated understory.

[3] Lodgepole pine forest and fescue grasslands occasionally intermixed with aspen stands.

[4] Very steep areas of scattered Douglas fir, Englemann spruce, subalpine fir, or limber pine on rock and scree.

[5] Open fescue-dominated grasslands.

[6] Floodplains and wet areas of mixed vegetative types.

* Road acreages are based on construction of a 14 foot wide road with 2:1 fill slope and 1 1/2:1 cut slope, allowing 10 feet extra clearing width (total clearing width of 35 feet). Disturbance would be greater for roads constructed on slopes over 25 percent, and less where roads were constructed on slopes less than 25 percent.

** Includes a crew camp.

Alternative D1 would have a potential for greater effect on vegetation along road segments in or adjacent to the riparian zone of Deep Creek, where vegetation is much more restricted.

Alternatives F8 and F9 could be expected to have a potential vegetation loss of approximately 10 acres of open and closed forest area. Much of the vegetation removed would be at the staging and drilling sites.

Not shown in Table 4.15 is the possibility of vegetation loss and vegetation type conversion caused by wildfires that might occur from the proposed operations. The risk of a fire event is small and is more likely to occur under *alternatives A2, B2, C2, and D1* than the other alternatives because of the extensive road construction and slash disposal work that would be required. Project burning plans would be approved by the Forest Service to reduce the risk of wildfire.

b. Chemical Damage to Existing Vegetation

Spills of petroleum products associated with this project could result in loss of vegetation. The most likely place for this to occur is adjacent to areas where vehicles and machinery are operating. Effects that would be common to *all action alternatives* would involve chemicals introduced to the drill site, either by vehicle or helicopter, and those chemicals associated with the natural oil and gas resources which may be present under the ground. Drilling fluids would be held in an approved, on-site reserve pit during the drilling phase. However, some introduced chemicals could conceivably be lost adjacent to the drill pad and native vegetation could be adversely affected. In all likelihood, such spills would involve very small quantities and have minimal impacts on the drilling area. Safeguards would be required in the permit to reduce the potential for such spills.

Possible leaks and spills of automobile and truck fluids could occur along roads and damage vegetation. *Alternatives A1, B2, and C2* would pose some risk to vegetation, as a variety of vehicles could be expected to use any road constructed. *Alternative D1* would have the highest potential for risk, with construction and use of a road along Deep Creek.

Any chemical spills into live water could cause a loss of vegetation for a considerable distance downstream. Spills along upland roads would likely be very localized and not affect surrounding vegetation.

Alternatives F8 and F9 would pose some risk when harmful chemicals where carried by helicopter. The potential for contamination would occur, should a load be lost or a helicopter crashed.

Any effect to vegetation from the release of hydrogen sulfide and other hazardous gases is discussed in Health and Safety (Section IV.2.O.). Any releases should be at levels regulated by State standards and should not be detrimental to surrounding vegetation. Any significant release of these gases from a blowout or other unregulated escape could kill vegetation downwind and in low areas adjacent to the drill site. In the extremely unlikely event that this should occur, the strong wind patterns common to the East Front would serve to disperse the gases.

c. Introduction of Noxious Weeds

Alternatives A2, B2, and C2 would have the greatest potential for increasing weed infestations, because the roadside areas of US Highway 2 are presently infested with Spotted Knapweed. Vehicles and equipment are major agents in the spread of Spotted Knapweed.

Alternative A2 would have the additional disadvantage of a spreadable Spotted Knapweed infestation bordering sections of the primitive road scheduled for rebuilding under this alternative.

Alternative D1 could have the highest risk for introduction and spread of noxious weeds. The combination of vehicle access, and the potential for noxious weeds to be carried downstream by Deep Creek, would increase the risk of dispersal outside the project area.

Potential for weed problems from the helicopter alternatives is much less then from the roaded alternatives (See Section IV.1.I.).

Management objectives for noxious weeds on the Lewis and Clark National Forest were identified in the Chevron Project (Section IV.1.I). Following these requirements, the introduction and spread of noxious weeds in the RM-1 Unit would be unlikely.

d. Plant Species of Special Concern

No plants listed as rare or endangered pursuant to the Endangered Species Act are known to occur in the project area. Plants of special concern, as listed in Appendix H, may occur in the area. Specific requirements for protecting rare and sensitive plants are discussed in Section IV.1.I.d.

e. Livestock Grazing

The implementation of any of the roaded alternatives could have some minor impacts on livestock grazing in the northern portion of the RM-1 Unit, however, reductions in available forage would be minimal and temporary (assuming that roads would be revegetated following any exploration activities).

If road use associated with drilling coincided with the permitted grazing seasons on one or more of the allotments, some coordination would likely be necessary for moving livestock on and off the Forest and for herding activities. There could also be increased hazards to livestock related to heavy vehicles traveling through grazing areas when cattle and sheep are present.

Alternative E (no action) would cause no change, so there would be no effects incurred under items a. through e. above.

Reasonably Foreseeable Actions

A Dry Hole

The effects of drilling a second well would be similar to those discussed for the exploration proposal, except the project would extend for a longer period of time. There may also be more acres of vegetation disturbed for additional roads and/or drill pads, depending on the location selected for the second well.

A One Well Production

Under all roaded alternatives some additional vegetation would be lost, with construction of a pipeline. The amount of vegetation loss would depend whether the pipeline could be placed within the road clearing limits. This cumulative effect would be short term, extending only until final reclamation is achieved.

For *alternatives F8 and F9*, an access road and a pipeline would have to be constructed, using one of the routes identified under the roaded alternatives. The loss of vegetation would be similar to that discussed for the roaded alternatives.

Additional risks of chemical damage to vegetation would occur with the well going into production. The risk of chemical damage would involve the possibility of leaks or spills by equipment during pipeline construction activities, and the chance of a large spill should there be a pipeline failure after production begins. Impacts would be potentially more severe with *alternative D1*, should the pipeline location be down Deep Creek, where gases would tend to concentrate and disperse slowly, or where chemicals could be introduced into water. Additional information about pipeline construction, monitoring, and safety is discussed in Section IV.1.A.

The risk of introduction of noxious weeds would be similar to those discussed for the exploration proposal. The risk would exist for a longer period - until production was ended. Mitigation measures would be imposed to control introduction of noxious weeds as described in the exploration proposal.

Effects and mitigation for plant species of special concern would be the same as for the exploration proposal.

The effects to livestock would be similar to that discussed for the exploration proposal, and would continue for the life of the well.

A Field Production

Some additional loss of vegetation would occur during drilling activity and development of the field. The amount of vegetation loss would be dependent upon the location of wells, in relation to any existing access roads constructed. It was estimated that an additional 2 - 10 acres of existing vegetation could be lost during drilling and development of the field. The effects to vegetation communities would be similar to that described under for the exploration proposal.

The potential for spills of petroleum products would increase with additional wells and associated activity. As with the exploration proposal, the highest potential for risk would be with *alternative D1*, and use of road sections along Deep Creek. The risk of adverse impacts resulting from spills would be reduced per Executive Orders 11988 and 11990, as discussed for the exploration proposal.

The risk for introducing noxious weeds would be similar to that discussed for the exploration proposal. With production of the field, the potential for introduction of noxious weeds would be for a long period of time. The Forest Service objectives for noxious weed management would minimize the threat of noxious weed introduction and dispersal.

Effects and mitigation for plant species of special concern would be the same as for the exploration proposal.

The continued use of access roads during development of the field, and production from the field would have some impacts on livestock grazing in the northern portion of the RM-1 Unit. Reductions in available forage, due to loss of vegetation, would be for the life of the field until reclamation has been established.

A more permanent method for coordination and control of moving livestock on and off the Forest, and for herding activities would be necessary to reduce the hazards to livestock from vehicles and heavy equipment.

J. OUTDOOR RECREATION

During the scoping period one issue was identified pertaining to the effects of the proposed project on dispersed and developed recreation. This section discusses how each of the alternatives affects: a. Recreation Opportunity Settings, and b. Recreation Use. None of the alternatives for the Fina project would affect any river eligible under the Wild and Scenic River Act.

Mitigation measures that would be needed to minimize the effects are discussed where applicable.

Exploration Proposal

a. Recreation Opportunity Settings

The majority of the area in the project vicinity is classified as having a Roaded Natural (RN) setting (Map 3.11). A small portion in the vicinity of Summit Campground is classified as have a Rural setting. These settings are defined in the ROS User's Guide (Forest Service, 1982) and have been discussed in Chapter III.J. More information may also be found in Appendix C. These areas are currently influenced by man's activities (US Highway 2, Burlington Northern Railroad, and Forest Service roads and trails). Interaction with others is low to moderate.

None of the action alternatives would alter the existing Recreation Opportunity settings of Roaded Natural appearing and Rural.

b. Rocreation Use

Recreation use that is likely to be affected by the project would be similar to that discussed for the Chevron Project (Section IV.1.J.). The effects on recreation activities are related to changes in trail systems, developed sites and other dispersed sites of concentrated use that may occur as a result of the proposed project activities.

Some effects on recreation activities would occur with each action alternative. The sights and sounds associated with exploration would distract from the natural setting and solitude sought by some recreationists (irrespective of season). Consequently, some recreationists would be displaced from areas they felt were adversely affected by the activity. Table 4.16 identifies the potential effects to these use areas by alternative. The effects are designated by actual physical displacement (D, direct), project activity noticeable but no displacement (I, indirect) and no notice of project activity by most users (N, none) that may be experienced by recreation users for the duration of project activity.

Table 4.16
Fina Project
Effects on Outdoor Recreation

Alternatives	A2	B2	C2	D1	F8	F9	E**
Trails	D	I	D	D	I	I	N
Two Medicine-Elk Calf Mountain National Rec Trail	N	N	D	N	I	N	N
Continental Divide National Scenic Trail	N	N	D	N	I	N	N
Pike Creek Road	N	N	D	N	N	N	N
Summit Campground	N	N	I	N	I	N	N
US Highway 2 Trailhead	N	N	I	N	I	N	N
Snowmobiling Loop	N	D	D	N	N	N	N
Marias Pass Snowmobile Area	N	N	D	N	N	N	N
Motorcycle/ATV	D	D	D	D	I	I	N

** no action
D=Direct Effect. Would cause physical displacement
I=Indirect Effect. Activity may be noticeable but would not cause physical displacement.
N=No effect. Sights and sounds of activity would be noticeable to most users.

The following discussion summarizes the effects on trails, Pike Creek Road, Summit Campground, US Highway 2 Trailhead, snowmobiling loop and play area, and motorcycle and ATV use as indicated in Table 4.16. Effects on other uses such as hunting are also included.

In general, for the roaded alternatives all trail users would be displaced from portions of trails during the road construction period. The amount of trail displaced and the trail number are detailed by alternative in Table 4.13 in Section IV.2.D-Access Management and Reclamation. Displacement from trails would occur for a period of approximately 1 year. Trail displacement may be mitigated by relocating trails. After completion of construction and trail use resumed, some trails crossing the access road and some overlap of trails with the access road would be unavoidable. Advance notice of trail closures during construction periods would be made available to the general public. Helicopter alternatives F8 and F9 would have the least effect on trail users. There would be no physical alteration of the trail system, however, the noise associated with helicopters could be very distracting to users and disrupt their recreation experience.

Trails would be affected the most by *alternatives A2, C2 and D1* because of the amount of trail that would be displaced and the number of road crossings. Road reconstruction for *alternative C2* in the vicinity of Summit Campground would displace the greatest number of trail users to other access points along US Highway 2. *Alternatives B2, F8 and F9* would cause more indirect effects to the recreation experience of trail users due to noise from construction and project vehicles or helicopter operations.

Approximately 1.5 miles of the Two Medicine-Elk Calf Mountain National Recreation Trail No. 133 would be displaced as a result of new road construction for *alternatives C2 and B2*. One crossing of the Trail by *alternatives C2 and B2* would be unavoidable (near Sawmill Flats) and would have to be made safe for trail users. *Alternative C2* would have the greatest effect on trail users because it is located in an area of concentrated recreation use and involves the greatest amount of trail displacement.

The Continental Divide National Scenic Trail extends into the southwestern portion of the RM-1 Unit. *Alternative C2* would directly affect the Trail because the access road proposed would share the same location for a distance of approximately 1.5 miles. This is the same effect as on the Two Medicine-Elk Calf Mountain National Recreation Trail because these trails share the same designation in that area. The road access may negatively affect the recreation experience sought by some users of the Trail and could lead to their displacement into other areas. *Alternatives B2, F8 and F9* would indirectly affect the Continental Divide National Scenic Trail from the noises and sights that would occur during project operations. *Alternatives C2 and D1* would impose the least effects on the Trail because activity would probably not be seen or heard by most trail users.

Mitigation measures for trails that may be included in an approved permit would be to relocate those miles of trails displaced by road construction (Chp.V-Mitigation and Monitoring, Table 4.13.). Relocation may also serve to avoid some of the road/trail crossings, however, some crossings would be unavoidable.

Effects on Pike Creek road would only occur with *alternative C2*. There would be a direct effect on the road because it would be closed to motorized travel during any reconstruction, new construction and drilling. Non-motorized users may be displaced due to noise and dust associated with project activities.

Summit Campground would be indirectly affected by *alternatives C2 and F8*. The campground is located close enough that the sights, sounds and dust associated with project activity would be noticeable to many users. Project activity would add to the activity that presently occurs from traffic along US Highway 2, and the Burlington Northern Railroad.

The trailhead along US Highway 2 could be indirectly affected by *alternatives C2 and F8* because of the sights and sounds associated with project activity.

Snowmobiling would be directly affected by several of the roaded alternatives. *Alternatives C2 and B2* would cross a portion of the South Fork Two Medicine snowmobile loop, Trail 101, in the vicinity of Sawmill Flats. This crossing may cause conflicts between snowmobiles and project vehicles. *Alternative C2* would also cross through the snowmobile play area near Pike Creek Road. This could result in snowmobile/project vehicle conflicts and would result in a loss of area.

Motorcycle and ATV use in the project area would be directly affected by all the roaded alternatives and could be indirectly affected by the helicopter alternatives. The direct effects include displacement from trails, crossings and trail closures. Trail displacements would be those found in Table 4.13. The relative degree of effect from displacement and crossings on trail users would be as previously discussed under trails. Trail closures for wildlife mitigation would also affect motorized users (Chp. V-Mitigation and Monitoring, Wildlife). These closures are as follows:

Trail 140 in its entirety - 3.5 miles
Trail 139 from its junction with Trail 172 to the junction of Trail 118 - 2.5 miles
Trail 118 from the private property at Rising Wolf Ranch to the junction of Trail 139 - 3.5 miles
Trail 181 in its entirety - 3 miles

These closures apply to all alternatives throughout all phases of the operation between July 1 - November 30. These closures would result in a total of 12.5 miles of trails unavailable for motorized use. For the period between December 1 - June 30, these trails will be managed according to the Lewis and Clark National Forest Travel Plan (Forest Service, 1988a).The area is currently managed in the Travel Plan with yearlong closures to road vehicles. Thus, the resulting availability of these trails for use by ATVs and trail bikes is as follows:

- The combined closures identified for wildlife mitigation and Travel Plan restrictions would result in the closure of Trail 140 on a yearlong basis to ATV's and trail bikes, except for the 1 mile portion between Trail 118 and the unimproved road in Section 13. This portion will be open December 1 - March 30.
- Trail 139 will be closed to ATVs and trail bikes on a yearlong basis as a result of the wildlife mitigation and Travel Plan restrictions.
- Trail 118 will be closed to ATVs and trail bikes on a yearlong basis from its junction with Trail 140 to its junction with Trail 139 as a result of wildlife mitigation and Travel Plan restrictions. The portion of Trail 118 between Rising Wolf Ranch and Trail 140 will be open to ATVs and trail bikes from December 1 to March 30.
- Trail 181 will be closed to ATVs and trail bikes on a yearlong basis from its junction with Trail 140 to the top of the drainage divide in Section 29 as a result of wildlife mitigation and Travel Plan restrictions. Trail 181 will be open to ATV's and trail bikes from December 1 to June 30 from the drainage divide in Section 29 to its junction with Trail 170.

Implementation of *Alternatives A2 and D1* would be similar with respect to their effect on recreation resources and activities. The major recreational use affected by implementation of these alternatives would be big game hunting. Some hunters would be displaced from areas they felt adversely affected their hunting experience due to the addition of a new road, while other hunters would consider improved access to their advantage.

Alternative B2 would have similar effects. Most effects would result from use from new road construction. Because the project road would cross the South Fork Two Medicine River near the present National Recreation Trail No. 133 crossing at Sawmill Flats, existing users and use patterns would be disrupted.

Alternative C2 would have effects similar to those described for alternative B2. The greatest disruption to existing uses would occur under this alternative. Because the project road would be located on and parallel to a major snowmobile trail (Snowmobile Loop Trail No. 134) and pack trail, an alternate snow trail would have be provided for safety reasons, especially during periods where snow removal was required. In addition, *Alternative C2* is routed within 1/4 mile of Summit Campground and would have a potential to create some distraction to campers during the summer season.

Implementation of *alternatives B2 and C2* could displace some hunters who camp in the Sawmill Flats area. Other hunters could consider the improved access to their advantage.

Alternatives F8 and F9 would involve the least amount of direct impact to recreation. This is because activity associated with exploration would be largely confined to landing zones located at the staging area and well site. No physical alteration would occur to trails or use areas. The staging area proposed under *Alternative F8* would possibly displace some hunter camps in the vicinity of Sawmill Flats. In addition, *Alternative F8* would have a greater impact to recreation users than *Alternative F9* as it would be in a location that receives a greater amount of use by recreationists.

For both motorized and nonmotorized travelers, *alternatives B2 and C2* would affect their activities the most. Uninterrupted loop options would be severely limited during the time of drilling. After completion, motorized opportunities could be enhanced, if some accesses remained available for motorized recreationists. Should the bridge across the South Fork of the Two Medicine River be left in place, snowmobiling opportunities could actually be extended beyond the normal limitations of "snowbridge melt" in late winter.

Nonmotorized recreationists activities may be displaced to the Bob Marshall and Great Bear Wilderness or Glacier National Park.

Reasonably Foreseeable Actions

A Dry Hole

The effects would be similar to those discussed for the exploration proposal. It is anticipated that Fina would drill a second test hole in a different location. Some additional access road may be required, dependent upon the alternative selected. Drilling a exploratory well would prolong the activity in the area. An additional environmental analysis would be required before a new exploratory site could be used.

A One Well Production

The effects on the Recreation Opportunity Settings would be the same as discussed for the exploration proposal.

The effects on recreational uses would be similar to those discussed for the exploration proposal. Pipeline construction activities would prolong trail closures and other disturbances to those using the area for recreation and hunting.

Should *alternatives 8 or 9* have been chosen, the construction of an access road and pipeline to facilitate production would effect recreation activities similar to the exploration proposal roaded alternatives.

The level of activity associated with exploration would diminish with the start of production. Noise, dust and sightings of equipment would correspondingly decrease.

A Field Production

The effect on the Recreation Opportunity Settings would be the same as for the exploration proposal.

The effects on recreational uses and resources would be similar to those discussed for the exploration proposal. Additional drilling and other field development activities would cause many recreationists to use other portions of the RM-1 Unit. Motorized activities could be enhanced if access remained open to public use.

Should *alternatives 8 or 9* have been used, the construction of an access road and pipeline would effect recreation activities similar to the exploration proposal roaded alternatives.

K. VISUAL RESOURCES (AESTHETICS)

This section discusses the effects that project implementation would have on the visual resource. Four issues were identified from the scoping process. These are: 1) Will the visual quality objectives outlined in the Lewis and Clark National Forest Plan (Forest Service, 1986a, pg 4-7) and for project level activity (Chapter III.K) be met?, 2) What would be the effect of the project on views from US Highway, private land, and Glacier National Park?, 3) What would be the changes in the existing visual condition, and the degree of change that would occur?, and 4) What measures can be implemented to maintain the area without degradation of the existing natural condition?

The following discussion describes how implementation of the various alternatives would affect the views from primary locations, which include: a) views from US Highway 2, (includes Amtrac route) b) views from viewpoints C and D, c) views from the Two Medicine-Elk Calf National Recreation Trail (viewpoints A and B), and d) views from the Autumn Creek Trail(viewpoint F). The effects of the proposed project activity on the visual quality objectives are also discussed. Mitigation measures that may be implemented to maintain the existing natural condition are included where applicable. Mitigation measures for visual resources are discussed in more detail in Chp.V-Mitigation and monitoring.

The visual quality objectives outlined in the Lewis and Clark National Forest Plan have been modified for this project level activity. This has been discussed in Chapter III.K. Refer to Map 3.15 for the project level visual quality objectives for the area.

Portions of the project would be visible from various viewpoints. Five viewpoints (A, B, C, D, and F) were identified as "critical" due to their location and the vistas that exist from them. Viewpoint A was analyzed using computer generated seen area Maps 3.12. Viewpoints B, C, D, and F were analyzed by cross-sectioning the area to develop seen area maps 3.12, 3.13. and 3.14. Cross-sectioning was done without the benefit of tree screening. The actual seen area could vary from that shown on the maps, depending on the amount of tree cover and the height of the trees. Thus, the maps show the maximum area that could be seen from the viewpoints. All viewpoints were located in clearings with grass as the major vegetation in the immediate area, thereby providing the widest viewing possible.

Exploration Proposal

a. Views from US Highway 2.

Alternative A2 would pass through areas with recommended visual quality objectives of Retention and Partial Retention and Modification. The intersection of alternative A2 with US Highway 2 would be at an existing road intersection, and in an open area, which should cause no additional visual disturbance. The visual quality objective for the area along US Highway 2 is Partial Retention. Mitigation measures, such as minimum road widths and planting shrubs and trees in disturbed areas should help reduce any apparent visual contrast.

Alternative B2 would pass through areas with recommended visual quality objectives of Retention, Partial Retention and Modification. Alternative B2 would require a new intersection at US Highway 2, near an existing trailhead. The new road would create cuts and fills, and timber removal on the moderately sloping ground within the foreground viewing zone of US Highway 2. Visible construction impacts could result in a reduction of the existing visual condition. The first 1/4 mile of the road would be located within a Retention zone and would not meet the visual quality objectives. When the visual quality objective is not met and the visual impact can be classified as EVC 4 or greater, the site should be rehabilitated within 2 years to restore the landscape to EVC 3 or better. Refer to Appendix I for more information on visual quality objective definitions. The disturbance caused by road construction would likely be greater than EVC 4. Thus the site would have to be rehabilitated within two years meet EVC 3. With implementation of mitigation measures described in alternative A2, the remaining length of road would meet the visual quality objectives. This alternative would have the greatest impact in the visual resources in the area.

Alternative C2 would pass through recommended visual quality objective areas of Partial Retention and Modification. Construction of a new intersection at US Highway 2 would not be required, as this alternative utilizes the existing Pike Creek Road intersection. The road alignment is screened from view immediately after its junction with the highway. Only the upper portions of the proposed road location would be visible from US Highway 2. Mitigation measures described in alternative A2 would reduce any adverse visual effects.

Alternative D1 could be visible from US Highway 2 from some locations. This alternative would be located along the slopes of the Two Medicine Ridge that would be viewed as middle ground and background. Due to the viewing distance of three to seven miles, the road construction would be reduced in the eyes of the casual observer.

Alternative F8 would cause some minor impacts to the visual quality at the landing zone. Proper siting and retention of vegetative screening would reduce or eliminate any adverse visual impacts. Views of helicopters in flight may be unavoidable for users in the vicinity of US Highway 2. Road construction to the staging area, utilizing the *alternative B2* access route, would create visual impacts. Comments for the first 1.5 miles of alternative B2 would be applicable.

Alternative F9 would not be visible from US Highway 2.

b. Views from Critical Viewpoints C and D near US Highway 2

The view from both viewpoints is a wide panorama of the Two Medicine Ridge. The South Fork Two Medicine River is below the line of sight due to topography and some vegetative screening. A small portion of the Continental Divide is visible between Elkcalf Mountain and Flattop Mountain. US Highway 2 is visible in the foreground, but not at greater distances. The widest panorama occurs from Viewpoint C. The drill site would be located within the viewing area about 2 1/2 miles further and over 600 feet higher in elevation than the critical viewpoints along US Highway 2. (See Map 3.13). The elevation difference places the observer below the area being viewed. The upper portion of the drill rig would be seen, however, the distance involved should render any views of the rig subordinate to the landscape. Lights would be visible on the drill rig at night. Clearing and ground disturbance around the drill site area would not be seen. Use of a muted color tone on the drill rig would help reduce the visual effect.

The area crossed by *alternative A2* south of the South Fork Two Medicine River would be seen. The area is gently sloping toward the viewer and is tree covered. Care in road location and minimal clearing should maintain the visual quality objective.

Portions of *alternative D1* would be seen along the slopes of Two Medicine Ridge. Where the slopes are tree covered, the road access should not be readily visible as the road would be two to five miles away from the viewer. A few ridges are devoid of trees, and road cuts and fills would be visible, should the road be located within the seen area on those ridges.

c. Views from Two Medicine - Elk Calf Mountain National Recreation Trail (critical viewpoints A and B)

The well site would not be visible from either viewpoint.

Alternatives D1 or F9 would not be visible from either viewpoint.

The only portions of the project visible from Viewpoint A would be in the immediate area around Sawmill Flat. *Alternatives B2 and C2* cross the north edge of the Sawmill Flat. Due to the relative flatness of the area, the alternatives should not be visible.

Alternative C2 would have approximately 1/2 mile of the National Recreation Trail trail paralleling the proposed access road within 1/4 mile of the trail. This could lessen the visual quality, however, proper mitigation measures should help reduce these effects.

Areas crossed by portions of *alternatives A2, B2, and C2* would be visible from Viewpoint B. *Alternative A2* may be visible at its junction with US Highway 2. However, due to the distance from the viewer and normal haze, the effect would be very slight.

Portions of *Alternatives B2 and C2* cross seen areas in the Pike Creek-Sawmill Flat area. Because of the tree cover, most of the access would be screened from the viewer. The greatest potential for viewing would be *alternative B2*, as it descends the ridge to the junction with alternative C2. Although much of the slope is tree covered, and would tend to screen most of the road from sight, not all of the access could be hidden, due to the superior location of Viewpoint B.

d. Views from Autumn Creek Trail Critical Viewpoint F.

The highest point on the trail would be approximately 260 feet higher and greater than 4 miles from the drill site. The trail drops in elevation to the east and passes behind a ridge. Although the viewpoints would be from superior viewing positions, the visual distance should help reduce any visual impacts. In addition, the vegetation cover along the trail combined with topographic conditions severely limit any views into the study area. Proper location of the drill site in relation to topography and vegetation screening should help meet the visual quality objectives. Mitigation measures, such as retaining as much vegetation screening of the drill site and proper coloring of the drill rig to blend with the background will also help to reduce visual effects. The major visual impacts from this trail are US Highway 2 and the Burlington Northern Railroad.

Alternatives A2, B2, C2, and D1 could be visible from the trail. However, terrain features combined with the existing vegetation patterns along the trail helps screen out any activity in the project area. Such mitigating measures as selective topography locations, reduced vegetative clearing, and seeding would help reduce the visual impacts.

Alternative D1 would be visible because it would be located along the slopes of the Two Medicine Ridge at about the same elevation as the viewpoint. Where the slopes were tree covered, screening would reduce the visual effect. Where slopes were treeless, road cuts and fills would be visible, especially where exposed soils where of contrasting colors. The distance of 4 to 8 miles from the viewer would help to reduce the visual effect. Revegetation by seeding grass and planting shrubs and trees and color treatment of rock cuts would also help reduce the visual effect.

Alternative F8, staging area and landing site, could be visible unless care was taken in location. Air transport activities, i.e., helicopter use would be visible from the viewpoint. The access road to the staging area could be visible and would have to be restored to EVC 3 or better within two years.

Alternative F9, staging area and landing site, would not be visible. Some helicopter activity could be visible from the viewpoint, but the distance and backdrop of Two Medicine Ridge would reduce the visual effect.

e. *Alternative E* (no action) would result in no man-caused change, so would have no effect on the existing visual quality.

A comparison of the effects of the proposed activity on the visual quality indicates that *alternative B2* would result in the greatest short and long term effects on visual quality (Table 4.17). Of the roaded alternatives, *alternative D1* would result in the least effects to the visual quality because it is furthest from the area of concentrated use along US Highway 2. Of the helicopter alternatives, *alternative F9* would result in the fewest visual effects because it traverses areas that are occupied by fewer people.

Table 4.17
Effects on Visual Quality by Alternative

Visual Quality	*A2*	*B2*	*C2*	*D1*	*F8*	*F9*	*E*
Retention	-*	--	-*	M	--1	M	M
Partial Retention	M	-*	M	M	-*	M	M
Modification	M	M	M	M	M	M	M

M = Maintained no significant reduction anticipated.
- = Anticipated short term reduction in visual quality.
-- = Anticipated short and long term reduction in visual quality*.
1 = If B2 road location is used. If not, the effects would be M.
* = Mitigation techniques may help reduce visual impact.

As prescribed in Chapter V, reclamation will be required following completion of the drilling operation. This mitigation requirement will ensure that revegetation and landscaping occurs consistent with Forest Plan requirements. A cumulative visual effect will be avoided and revegetation will reduce visual impact to a level prescribed in the Forest Plan.

Reasonably Foreseeable Actions

A Dry Hole

Exploration of another well near the proposed Fina well site should not create any additional visual impacts. Although the drill site could be moved, the visual effects should remain approximately the same, as long as the drill rig remains in the general area. Any effects would persist for a longer period of time.

A One Well Production

Application of mitigation measures, such as minimum road widths and minimum clearing with revegetation of disturbed areas, would help reduce contrasts caused by road and pipeline construction near US Highway 2.

Regarding Viewpoints C and D, *all roaded alternatives* should have visual effects similar to those discussed for the exploration proposal. Any visual effect from pipeline construction would be small, as long as the pipeline paralleled the road. *Alternatives F8 and F9* would require an access road and a pipeline to be constructed along one of the road alternatives. The effects would be similar to those discussed for the roaded alternatives for the exploration proposal.

The visual effects for *all roaded alternatives* when viewed from viewpoints A and B should be similar to those discussed for the exploration proposal. The pipeline would be constructed along the access road, and visual effects should be similar to those discussed for the roaded alternatives.

Alternatives F8 and F9 would require an access road and a pipeline to serve the well site. The access road and pipeline would be constructed along one of the roaded alternatives. Visual effects would be similar to those discussed for the roaded alternatives.

Regarding viewpoints F, in Glacier National Park, the visual effects for *all roaded alternatives* should be similar to those discussed for the exploration proposal. The pipeline would be constructed along the access road, with visual effects similar to those discussed for the roaded alternatives. *Alternatives F8 and F9* would require an access road and a pipeline to serve the well site. The access road and pipeline would be constructed along one of the roaded alternatives. Visual effects would be similar to those discussed for the roaded alternatives.

A Field Production

Effects to the visual resource should be similar to those discussed for the exploration proposal, and one well production. The effects of any additional roads and wells would be dependent upon their locations. The original access road would be utilized to the extent possible for any subsequent wells. Because the test well site would not be visible, it is not likely that other wells would be visible.

If a pipeline is necessary for production, visual effects would be similar to those of the exploration proposal. The pipeline would likely be confined to the access roadway.

Application of mitigation measures, such as minimum road widths, minimum clearing, revegetation of disturbed areas by grass seeding and planting shrubs and trees, and color treating any rock cuts would help reduce contrasts caused by road and pipeline construction. Care in location of the well sites in relation to topography and vegetation screening will help meet the visual quality objectives. Under these conditions, cumulative effects on the landscape when viewed from US Highway 2 and viewpoints A through F should not be evident under any of the alternatives.

L. CULTURAL VALUES

The following discussion describes how implementation of the various Fina alternatives could affect traditional Blackfeet culture, religious practices, spiritual values, and archaeological resources.

Concerns and issues expressed regarding cultural values were basically the same as for the Chevron area. Three issues were expressed:

1. Concern that the religious significance of the Hall Creek area be considered, and that consultation be in accordance with the American Indian Religious Freedom Act of 1978 (AIRFA),
2. Agency responsibilities and compliance efforts with the American Indian Religious Freedom Act of 1978 (AIRFA) and also protection of religious rights in accordance with the First Amendment to the U.S. Constitution, and
3. Concern that the cultural resource inventory (archaeology) be completely accurate.

Exploration Proposal

a. Blackfeet Indian Traditional Culture and Religion

The practice of traditional Blackfeet culture and religion would receive both direct and indirect effects from all of the proposed action alternatives. The Blackfeet traditionalists view all phases of the proposed project as negatively impacting their culture and practice of religion. Some traditionalists believe that the project would "drive the spirits away."

Direct effects, for all action alternatives, would include visual, auditory, and physical changes. A drill rig or pump may be regarded as out of character with the area, and therefore visually undesirable. The introduction of noise, caused by drilling and vehicle travel, would disrupt the quiet and "peacefulness" deemed necessary for some religious pursuits. Opportunities for a person to experience solitude would decrease. Physical changes would occur, as a result of road building or helicopter activity. Vision quests or some praying could be affected, as a result of the need for quiet and solitude. Sweats and sun dances may not be affected as these can be undertaken virtually anywhere which is designated. They have been observed occurring near highways and active railroad lines.

Traditionalists most often expressed concerns for indirectly related impacts (for all action alternatives). Many Blackfeet traditionalists see a need for some lands to remain undeveloped for future generations. They view the RM-1 Unit as "a last stronghold for pristine conditions." They see other areas which are traditionally considered spiritual, such as Chief Mountain in Glacier National Park, as having received too much disruption. In the past, traditionalists fasting and praying in Glacier Park have been interrupted by curious tourists. The Sweet Grass Hills, another traditionally significant area, are currently disrupted by ongoing mineral exploration, against the wishes of the traditionalists.

The Blackfeet also have a concern about the character of the area changing because of the renewed interest that members are taking in the traditional ways. As discussed in Chp. III.L, an increasing number of Blackfeet are participating in traditional practices. People recovering from drug and alcohol dependencies are encouraged to receive support from the traditional beliefs. Again, there is a concern that other locales will not be available to practice traditional religion, and so the RM-1 Unit has gained significance.

The *single well* or *three-well production* phase may be less impacting than the exploration phase. The production phase would involve much less human activity and less noise. Production could be less impacting visually, also. The production phase presents some opportunities for mitigating impacts, such as limiting the number of on-site inspections.

Alternatives A2, B2, and C2 would have similar effects. The approaches to the drillsite are different, but all go through Sawmill Flats. Prayer cloths have been observed tied in trees in the Sawmill Flats area. The Blackfeet have not identified a need to preserve these prayer cloths, nor have they disclosed any potential adverse impacts caused by exploration to the Sawmill Flats area.

A sweat lodge was observed in the floodplain of the South Fork Two Medicine in 1987. It is not known, however, if this was involved in a Blackfeet traditional ceremony. Another sweatlodge located near *alternative A2* utilized metal materials; Blackfeet traditionalists stated that this would not have been Native American for this reason.

There are no known effects or specific concerns for traditional culture and religion for *Alternative D1*.

There are no known effects or specific concerns for traditional culture and religion for *Alternatives 8 and 9*.

Alternative E would have no effect on the current status of traditional Indian religious practices.

Blackfeet traditionalists expressed concern for a site which is located outside of the area of impact for the road location which leads to the drillsite. Further analysis of the site (including field review with the Blackfeet Cultural Director), literature review, along with informal review by a number of professional archaeologists, confirmed the Forest Service's position that the site does not appear to be a National Register eligible site. The Forest Service interpretation of the site differs from that offered by some Blackfeet traditionalists. The site does not appear to be significant based on the National Register of Historic Places criteria (36 CFR 60.4). The State Historic Preservation Office concurred with this determination December 27, 1985. Regardless of interpretation, there should be no conflict with reconstruction/construction of this road and site protection.

b. Agency Responsibilities and Compliance with American Indian Religious Freedom Act and Protection of Religious Rights in Accordance with the First Amendment

The Lewis and Clark National Forest began working with the Blackfeet Tribe and traditionalists regarding land management and cultural concerns prior to receiving Chevron's APD. A "General Working Group" was set up by the Tribe to address cultural issues: membership included tribally recognized cultural/religious leaders and interested persons. Attendance at these meetings was virtually open (see Chapter III.L.b for further description of participants and meetings). In addition, a number of the people who are traditionalists and/or have cultural concerns participated in the Social Assessment for this EIS. Understanding of the cultural and religious concerns was further enhanced through the ethnological/ethnohistoric overview prepared by Deaver (1988), which is hereby incorporated by reference.

While the traditionalists have identified general concerns regarding disturbance to cultural values in the RM-1 Unit, they have been reluctant to discuss any specific potential effects caused by oil and gas exploration to the practice and belief in their traditional religion. The Forest has been willing to assess specific impacts for consideration in selecting a preferred access alternative. The Forest has provided and continues to provide opportunity for this type of input. Also, specific information would allow the development of mitigation measures. Blackfeet traditionalists have stated that given their position of total opposition to the oil and gas proposals, this would not be possible.

c. Archaeological Resources

Archaeological resources could potentially be affected by both direct and indirect impacts. Direct effects could involve the disturbance of a buried archaeological deposit, which could result, for example, during road construction. Indirect effects could result from an increased opportunity for people to access an archaeological site and possibly removing artifacts. If a site is discovered during any phase of the project, the Forest Service would conform to procedures as established in the National Historic Preservation Act, regulations in 36 CFR 800. All effects would be assessed.

The Fina drillsite and alternatives area has received substantial archaeological inventory. *Alternatives A2, B2, and C2* have been surveyed at least twice, as has the drillsite. At least nine separate surveys have been conducted in the general area. Cultural resources for each alternative are discussed below. One historic site was recorded on the last leg of the road common to alternatives A2, B2, and C2 which traverses east up along Two Medicine Ridge to the drillsite. This site was determined insignificant and ineligible for listing on the National Register of Historic Places by the State Historic Preservation Office (SHPO) (letter dated 12/27/85). Interpretation of the site was later questioned by Blackfeet traditionalists (see discussion above regarding Blackfeet culture, Alternative E). The Lewis and Clark Forest continues to hold the opinion that the site is not significant, and that sufficient recordation has occurred. Regardless, the site is located sufficiently away from the right-of-way that it should not be impacted by road development, possible vandalism, or any other exploration related activities.

Two cultural sites are located in proximity to *Alternative A2*. One site was determined not significant by the SHPO (letter dated January 23, 1986) and does not require any additional work. If this alternative was selected, the significance of the other site would need to be determined prior to any ground disturbing activity. This would involve testing the site for subsurface cultural materials and interpreting information to determine site significance and National Register eligibility. Conclusions would then conform to procedures established in 36 CFR 800 (refer to Chp. III).

Intensive archaeological inventory yielded no cultural sites on or near the *Alternative B2* corridor.

The Roosevelt Memorial Monument, which was determined to be eligible for listing on the National Register of Historic Places by the State Historic Preservation Office, is located about 1/2 mile away from *alternative C2*. However, this road is an existing road, and should not cause any effects to the site -- either direct or indirect. No other cultural sites have been identified on or near the *Alternative C2* corridor. Of the three highway approaches, this alternative appears to have the greatest probability for site occurrence, as it would allow access onto the ridge which parallels above Summit Creek, which would presumably have been a good travel route.

Alternative D1 has not received intensive archaeological survey, although a sample survey was conducted. Complete survey of this alternative would be conducted if selected as a preferred alternative.

Alternatives F8 and F9 would not cause any effects to known archaeological sites.

Alternative E would have no effect on any archaeological sites, or on the area archaeology.

Reasonably Foreseeable Actions

Dry Hole

Drilling another exploratory hole, if the first one proved dry, should not create any additional effects other than extending the amount of time of visual effects, noise, and other activities.

If the drill pad is to be moved, it will be determined at that time whether an archaeological survey is required. Any additional roads would require a complete archaeological investigation prior to ground disturbance.

A Single Well and A Field Production

The production phases may be less impacting than the exploration phase. The production phase would involve much less human activity and less noise. Production could be less impacting visually, also.

Wellsite production facilities could be located within the area which has received previous archaeological inventory. It may be necessary, however, to conduct additional inventory prior to construction of the well(s) and associated land disturbance. Electrical power may be needed to operate production equipment. Archaeological inventory would be required prior to any finalization of power installation plans.

The pipeline location would also require archaeological inventory. If a pumping station or any other production facilities were determined necessary, archaeological inventory would be required. Inventory would also be conducted for any additional roads or any other ground disturbing activities outside of the areas which have received intensive archaeological inventory.

Specific archaeological needs would be determined in the additional decision document. Included in the Oil and Gas Lease Stipulations (Appendix A) in the Cultural and Paleontological Resources discussion is a statement that mitigation measures would be implemented to preserve or avoid destruction of cultural resource values.

M. BLACKFEET RESERVED RIGHTS

The issues expressed by the public for the Chevron project also apply to the Fina project: 1) Blackfeet hunting and fishing rights, 2) Blackfeet timber rights, and 3) the Blackfeet rights to access the RM-1 Unit, or the closure or reclaiming of roads providing access to the proposed well site.

The basis of the present use rights accorded the Blackfeet Indians concerning the RM-1 Unit of the Lewis and Clark National Forest is the Blackfeet Agreement of 1896. The content of this Agreement is the same as that discussed for the Chevron project (Section IV.1.M)

Mitigation measures that would be needed to minimize the effects are discussed for each scenario where applicable.

Exploration Proposal

Any discussion related to the Blackfeet Reserved Rights would be the same as in for the Chevron Project, Section IV.1.M.

Reasonably Foreseeable Actions

The discussion contained in the Chevron Project, Section IV.1.M would apply for the Fina Project.

N. SOCIOECONOMICS

This section discusses the economic and social consequences associated with this project. Five general areas of concern were identified during the public scoping process. These included: 1) Costs to the local communities for public services would far outweigh any benefits derived from employment and income during oil and gas exploration, 2) Displacement or change in the economic base now derived from tourism, as a result of oil and gas exploration, 3) Delays or denial of the permit would diminish an important economic benefit to the State and the local communities, such as taxes for public services, 4) Consideration of effects that an increased number of people could have upon visual aesthetics and quality of life attributes be included in the analysis, along with the social impacts to the local communities, and 5) Consideration of effects that an increase in the number of people, and the associated activity, would have upon the present "quality of life" in the area.

The economic effects are discussed in the first section, and the social effects are discussed in the second section.

1. Economic Conditions

The economic issues are discussed in this section in terms of: 1) employment opportunities and the associated personal earnings, 2) changes in business activity and the local tax base, and 3) additional public service requirements.

Exploration Proposal

a. Employment

Exploration drilling of the Fina well would provide short-term employment opportunities. Employment would be concentrated in the mining, construction and transportation sectors of the economy. About 30 full-time workers would be associated directly with drilling operations. These workers would include the drill rig crew, mud loggers and tool pushers. Local expenditures for goods and services are estimated at $1.7 million for helicopter and roaded access alternatives.

Local expenditures would depend upon the availability of oil and gas support services in the local area and actual surface and subsurface conditions encountered at the time the well was drilled. These expenditures could result in $2.7 million to $2.8 million dollars in business activity for the regional area (Glacier, Toole, Pondera, Teton and Cascade Counties). This business activity could support 40 jobs in construction, transportation, oil/gas services, and retail trade. Many of the job opportunities would be provided by existing services and taken by local residents.

Table 4.18 shows estimates of the exploration costs, local expenditures, business activity, employment and personal earnings with exploration of the Fina well under all alternatives.

Table 4.18
Estimates of Exploration Costs, Local Expenditures, Business Activity, Employment and Earnings with Exploration of the Fina Well (Thousands of Dollars)

	Roaded Access Alts. A2, B2 C2 and D1	Helicopter Access Alts. F8 & F9	No Action Alt. 12
Exploration Costs	$6,900 - $7,100	$14,400	0
Local Expenditures	$1,700	$1,700	0
Business Activity	$2,700	$2,800	0
Employment			
On Site Workers	30	30	0
Other	40	40	0
Total	70	70	0
Earnings	$1,500	$1,500	0

For *alternatives A2, B2, C2, and F8*, employment impacts related to exploration would occur in the community of East Glacier Park with minor impacts to Browning, Cut Bank, and Great Falls in terms of increased numbers employed and the settlement pattern of non-local temporary workers. The number of workers residing in East Glacier Park would depend on whether a camp was available at the well site for the drill rig crew. Employment would occur during the drilling operation when 2 to 30 full-time temporary workers could reside in East Glacier Park while another 4 jobs would be in the construction, transportation, oil/gas services, and retail trade and probably taken by local residents.

With *Alternatives D1 and F9*, employment effects would occur primarily in the communities of East Glacier Park and Browning, with minor impacts to Heart Butte, Cut Bank, and Great Falls, in terms of increased numbers employed as well as the settlement patterns of non-local workers. Employment would occur during the drilling operation when about 2 to 5 full-time temporary workers could reside in East Glacier Park and 2 to 25 workers could reside in Browning. Another 5 jobs would be in the construction, transportation, oil/gas services, and retail trade and probably taken by local residents in East Glacier Park and Browning.

Other exploration jobs in construction, transportation and oil/gas services are expected to occur in Glacier, Toole, Pondera, Teton and Cascade Counties. Increases in construction employment as well as increases in various service sectors would account for the main employment effects. While there would be some effect on employment in the short-term, this activity would benefit the existing oil and gas service sector and not create many new jobs. New jobs associated with exploration would probably be taken by local residents.

b. Population

Under *Alternatives A2, B2, C2, and F8*, exploration would result in short-term impacts to the community of East Glacier Park as the result of population growth associated with temporary non-local workers. The population of East Glacier Park could increase by one percent (with a crew camp) to 8 percent (without a crew camp) for a short period. It was assumed that workers would not be accompanied by their families.

With *Alternatives D1 and F9*, exploration would result in short-term impacts to the communities of East Glacier Park and Browning. The population of East Glacier Park could increase by one percent and the population of Browning could increase by 0 to 4 percent (with and without a crew camp) for a short period.

Exploration involves relatively few personnel, and employees are often single or unaccompanied be dependents, reside in transient facilities, and eat in local restaurants. With no significant long-term population increases, there would be no community service impacts (e.g., water, sewage, schools) or impacts from traffic or law enforcement problems that would be project related.

c. Personal Earnings

Under *All alternatives* (except no action), there would be less than a one percent increase in earnings. The local communities in which the workers and their families reside would experience some increases in economic activity as a result of employees' payroll expenditure and company expenditures for goods and services.

d. Housing

The single most significant potential impact expected to occur as a result of exploration involves the temporary demand for housing during the drilling timeframe. To a large extent, the non-local's choice of housing reflects the short duration of certain petroleum related activities, namely well drilling. Exploration related workers generally prefer apartments, mobile homes, or recreational vehicles. Most of these workers seek lodging as close to the work site area as possible or within the current boundaries of, or adjacent to, incorporated towns. This reflects the service, trade, housing supply, and governmental infrastructure presently available. This usually places a heavy strain on the local housing supply, especially motels and trailer/RV parks/campgrounds.

Under *alternatives A2, B2, C2, and F8*, about 2 to 30 temporary housing units could be required in East Glacier Park (with and without a crew camp). A temporary housing demand could displace tourists looking for accommodations during the summer months.

With *alternatives D1 and F9*, about 2 to 5 housing units could be required in East Glacier Park and 2 to 25 units in Browning (with and without a crew camp). This housing demand would be short-term. Actual occupancy could vary depending upon the family status of temporary workers. If workers were accompanied by their families, the demand for mobile homes and/or apartments could increase.

e. Public Finance

All action alternatives would provide for the exploration and possibly for eventual production of oil and/or gas. Production would increase the tax base and provide revenues to the State and Glacier County.

Alternative E (no action) would result in no change, so there would be no effects.

Reasonably Foreseeable Actions

A Dry Hole

Exploration drilling of another well at the Hall Creek site would continue to provide employment opportunities, but to a lesser degree than the first well. About 30 full-time workers would be associated with drilling operations.

Local expenditures for goods and services are estimated at $1.6 million for helicopter access and $1.3 million for roaded access. These expenditures could support 27 to 32 short-term jobs in construction, transportation, oil/gas services, and retail trade. Exploration jobs are expected to occur in Glacier, Toole, Pondera, Teton and Cascade Counties. This activity would continue to benefit the existing oil and gas service sector and not provide many new jobs. Table 4.19 shows an estimate of the exploration costs, local expenditures, business activity, employment and personal earnings associated with drilling a second well at the Hall Creek site.

Drilling a second well could result in short-term changes in employment, population, and housing demand primarily in East Glacier Park and/or Browning. These impacts would depend upon whether a crew camp at the wellsite is available for the drill rig crew. Impacts would be similar to those described in the discussion on exploration of the first well but would extend the impacts over a longer period of time (i.e. two drilling timeframes).

Table 4.19
Estimates of Exploration Costs, Local Expenditures, Business Activity, Employment and Earnings with Drilling a Second Well at the Hall Creek Site (Thousands of Dollars)

Roaded Access	Helicopter Alts. A2, B2 C2 and D1	No Access Alts. F8 & F9	No Action Alt. 12
Exploration Costs	$6,600	$14,200	0
Local Expenditures	$1,300	$1,600	0
Business Activity	$2,100	$2,500	0
Employment			
On Site Workers	30	30	0
Other	27	32	0
Total	57	62	0
Earnings	$1,500	$1,500	0

A One Well Production

Employment effects would be expected to occur primarily in Glacier, Toole, Pondera, and Cascade counties during road, pipeline, and production facilities construction. The greatest impact would occur when an estimated 50 to 65 workers would be development related. After production facilities were developed, only a few workers would be associated with maintenance.

While there would be some effect on employment in the short- and long-term, this activity would benefit the existing oil and gas service, retail trade, and service sectors and not provide many new jobs. Any new jobs provided by production would probably be taken by local residents. Table 4.20 shows an estimate of the production costs, local expenditures, business activity, employment and personal earnings associated with a single well.

Table 4.20
Estimates of Production Costs, Local Expenditures, Business Activity, Employment and Earnings Associated with a Producing Well at the Hall Creek Site (Thousands of Dollars)

	Roaded Access Alts. A2, B2 C2 and D1	Helicopter Access Alts. F8, F9	No Action Alt. 12
Production Costs	$1,700 - $1,900	$2,000	0
Local Expenditures	$1,700 - $1,900	$2,000	0
Business Activity	$2,800	$3,300	0
Earnings	$800 - $900	$900	0
Employment	50 to 60	65	0

Production-related population increases would be short-term and spread out over a large area. This would occur primarily in Cut Bank, Conrad, Shelby, and Great Falls where most of the oil and gas service related businesses are located. Other effects would be similar to those discussed for the exploration proposal.

There would be less than a 1 percent increase in personal earnings during this phase. The communities in which the workers and there families reside would experience some increase in economic activity as a result of employee's payroll expenditure, and company expenditures for goods and services.

Maintenance of the well would require only a few workers. More permanent housing would be needed.

One effect to the local economy from oil or gas production would be additional public revenues. Tax revenues from production would increase, thus benefiting Glacier County and the State. Federal mineral receipts would increase and are distributed as follows: 50 percent to the State Treasurer, 40 percent to the Reclamation Fund of the Bureau of Reclamation and 10 percent to the U.S. Treasury. Figure 4.9 shows the royalties and taxes for each dollar of natural gas production and the distribution of those monies.

A Field Production

Field development would result in employment opportunities associated with additional road construction, pipelines and facilities along with drilling additional wells. Employment during road, pipeline, and production facilities construction would be an estimated 50 to 65 workers. Each additional well drilled would require 30 workers associated with drilling operations and another 27 to 32 short-term jobs in construction, transportation, oil/gas services, and retail trade. After production facilities were developed and additional wells drilled, only a few workers would be associated with maintenance.

Field development-related jobs would occur primarily in Glacier, Toole, Pondera, Teton and Cascade Counties. While there would be some effect on employment in the short- and long-term, this activity would benefit the existing oil and gas service, retail trade, and service sectors and not provide many new jobs. New jobs provided by field development would probably be taken by local residents. Table 4.21 shows an estimate of the production costs, local expenditures, business activity, employment and personal earnings associated with production facilities along with drilling an additional well at the Hall Creek site.

Drilling additional wells would result in short-term changes in employment, population, and housing demand primarily in East Glacier Park and/or Browning. These impacts would depend upon whether crew camps are allowed at the well sites. Employment impacts would be similar to those described in the discussion for the exploration proposal, but would extend the impacts over a longer period of time.

Effects on population would be similar to those described in the discussion for the exploration proposal and one well production scenario. These effects would extend for a longer period of time.

Effects on personal earnings would be similar to those described in the discussion for the exploration proposal and the one well production, but would be extended over a longer period of time.

Table 4.21
Estimates of Development Costs, Local Expenditures, Business Activity, Employment and Earnings with Production Facilities and Drilling an Additional Well at the Hall Creek Site (Thousands of Dollars)

	Roaded Access Alts. A2, B2 C2 and D1	Helicopter Access Alts. F8, F9	No Action Alt. 12
Development Costs	$8,300 - $8,500	$16,200	0
Local Expenditures	$3,000 - $3,200	$3,600	0
Business Activity	$4,900 - $5,900	$5,900	0
Employment			
On Site Workers	30	30	0
Other	77-87	97	0
Total	107-117	127	0
Earnings	$2,100 - $2,200	$2,300	0

Effects on housing would be similar to those described in the discussion for the exploration and one well production proposals but would be extended for a longer period of time.

One effect to the local economy from oil or gas production would be additional public revenues. Tax revenues from production would increase, thus benefiting Glacier County and the State. Figure 4 shows the royalties and taxes for each dollar of gas production and the distribution of those monies.

2. Social Conditions

This portion of the socioeconomic section describes the effects of oil and gas development on the communities surrounding the RM-1 Unit and the people who utilize the National Forest System lands. Specifically addressed are the effects on the following: 1) Lifestyles, 2) Attitudes, Beliefs and Values, and 3) Social Organization.

The Lifestyles discussion includes direct and indirect economic relationships to the communities and their aesthetic ties to the land. The attitudes, beliefs, and values section addresses the feelings, preferences, and expectations that the communities have for management and use of the lands. The social organization section refers to effects on the cohesion, stability or social institutions now existing in the communities. These three selected variables have been selected because they will show the most important social changes likely to occur under each alternative.

Exploration Proposal

a. Lifestyles

The economic gains for any of the communities surrounding the National Forest lands would be short term. The economic analysis was similar to that discussed for the Chevron Project (30 full-time workers associated directly with the drilling operations and an additional 70 short-term jobs in construction, transportation, oil/gas services and retail trade). The exact number of jobs would be dependent on the alternative selected and the conditions encountered during drilling. Most positions would be absorbed by the local communities (Cut Bank, Great Falls, and Shelby) already supporting these types of services.

With *alternatives A2, B2, and C2*, which enter the RM-1 Unit from US Highway 2, and *alternative D1*, the limited number of jobs would most likely occur in East Glacier Park and Browning. Unemployment has not been a major problem for East Glacier Park, as many residents are professionals and commute to Browning for employment. Any benefit for some employment of persons from the Browning and Blackfeet Reservation area would be similar to that discussed for the Chevron Project (See Section IV.1.N.).

Because oil and gas-related businesses are established in Cut Bank, any of the action alternatives could result in a slight increase in business trade. The existing business sector would benefit.

Alternatives F8 and F9 would provide less economic effect to any of the communities. Fewer jobs would be needed and the experience necessary to fill the jobs would be more specialized.

With *alternatives A2, B2, and C2* exiting from US Highway 2, the tourist-based trade industries in the East Glacier Park and Browning areas could have a slight increase in trade for restaurant, motel, grocery store, and gas station businesses. The amount of trade would be dependent on whether a crew camp was established. The effects would be similar to those discussed for the Chevron Project (See Section IV.1.N.).

The types of workers associated with the oil/gas and construction businesses would be very different than the summer tourist or the fall hunter travelling through and utilizing the community's services. Some feel this mix of cultures would be incompatible. *Alternatives A2, B2, and C2* would be most impacting to East Glacier Park because of their access locations.

b. Attitudes, Beliefs, and Values

The effect of *alternatives B2, and C2* would be about the same as discussed for the Chevron Project alternatives 1A, 1B, 6A, 6B, 7A, and 7B (See Section IV.1.N.), because of entry off US Highway 2.

1) The effects to the RM-1 Unit would be less than for the Chevron Project, as the Fina well is closer to US Highway 2. It is likely that the East Glacier Two-Medicine Alliance would remain opposed to any development of the area.
2) Access across the South Fork Two Medicine River, in the vicinity of Sawmill Flats by (*alternatives B2 and C2*) could displace the many East Glacier Park, Browning, and Cut Bank residents and others, as discussed for the Chevron Project (See Section IV.1.N.). There would be less of an opportunity to improve snowmobile use, as the Fina well is away from the area of snow play.
3) Pollution of the waters in the South Fork Two Medicine River would be another concern shared by environmentally-oriented groups, traditional religious groups, outfitters, livestock operators and some adjacent landowners. This concern is caused by the perception that the government would not be able to adequately control and monitor the drilling operations sufficiently to maintain water quality.
4) The Blackfeet traditional practitioners believe that any alternative (regardless of location) would displace their religious practices from the area. Recently, a sweatlodge was constructed and used along the South Fork Two Medicine River near Sawmill Flats. Although the significance of the site is unconfirmed at this time, *alternatives B2 and C2* cross the river near the site and could affect any future use of this sweatlodge.
   The traditional religious practitioners view any development, and the associated increased use, as a detriment to their continued use of the area for religious purposes. Refer to Section IV.2.L for additional information on the effects to Cultural/Religious practices.
5) *Alternatives B2 and C2* could be disruptive to the outfitter guides, as these alternatives provide better access to the existing Trail 101 and the South Fork Two Medicine River, and replace the trail from US Highway 2 to the River.

Alternatives A2 and D1 would be less disruptive to the outfitter guides as these routes are located away from outfitter guide travel routes.

Alternatives F8 and F9 would be less objectionable to individuals who prefer to see the RM-1 Unit remain roadless, as this portion of the RM-1 Unit already has some roads. Accessing without roads would be considered less of an intrusion on the land. Some doubt has been expressed about the Forest Service's ability to enforce road closures and/or restrictions, and whether the government would be able to control poaching.

Any support for the exploration proposal would be similar to that discussed for the Chevron Project (See Section IV.1.N.).

c. Social Organization

Because of the short drilling period involved, drilling activity is not expected to affect any community's social structure. The difference in the land use philosophy, between those favoring and those opposing development, could cause some community fragmentation. *Alternatives A2, B2, and C2*, because of their close proximity to East Glacier Park, could serve to widen the gap between these two groups.

The difference in opinion over the religious significance of the RM-1 Unit among the Blackfeet people could either widen an already existing gap between the members, or unite them in a common cause for protection of their cultural and religious rights. Some contend that the RM-1 Unit is sacred ground in need of protection from all development. Others feel that the area is the last vestige of undeveloped land that traditional religious practitioners have available for their use. And still others feel that the RM-1 Unit is not significant nor necessary for tribal religious practices. Refer to Section IV.1.L. for additional information on the effects to Cultural/Religious practices.

Alternative E would have no effect on any of items a., b., or c. above.

Reasonably Foreseeable Actions

A Dry Hole

Effects of drilling a second exploration well at the Fina site would be similar to that discussed for the Chevron Project (See Section IV.1.N.). A second exploration well would increase the length of time (by 1 or 2 years) for any disturbance and/or benefits to the communities.

A One Well Production

The production from one well would not affect the lifestyles in the surrounding area. Production would be viewed favorably by local oil and gas business interests in the Cut Bank and Browning areas, due to the increased potential for economic gain.

Production facilities would be viewed as similar to that discussed for the Chevron Project (See Section IV.1.N.). Production would intensify any concern for maintaining water quality and air quality. Perceived problems of pipeline leaks and associated resource damage would be increased with the production scenario. Should *alternatives F8 or F9* have been used for exploration, roaded access for pipeline construction would be needed and the effects to attitudes, beliefs, and values would be similar to those discussed for the Chevron Project (See Section IV.1.N.). Should *alternatives A2, B2, or C2* be used for access, the effects on recreationists, as discussed for the exploratory phase, would become more permanent (Refer to Section IV.2.J).

There would be no effect to the social organization of local communities.

A Field Production

If a significant discovery resulted in a field development, the county revenues would be increased. Tax-based dollars could be used in the local communities for improvements. Oil and gas-related businesses, particularly in Cut Bank, would have the greatest economic opportunities, since the training and businesses are already established. More jobs would also become available for those seeking employment on the reservation. *Alternatives A2, B2, and C2* would be most beneficial for the Browning/Cut Bank and East Glacier Park communities.

It would be difficult to project whether new business ventures would spring up in small communities like Heart Butte. Any potential for longer term employment and the associated needs for spinoff business ventures would be dependent upon the amount of development, and the location of treatment facilities.

Under all the alternatives, housing needs for longer term and larger numbers of employees could become a problem for the East Glacier Park community, where housing is limited. This could cause the cost of housing to rise above the income of local residents.

Local retailers could find their current tourist-based industry converted to a more industrial-based economy. This change could be difficult for those residents who chose to live in East Glacier Park for its "small-town" atmosphere.

Those who utilize the Sawmill Flats area and the Two Medicine drainage for their recreation pastimes and livelihood (nonmotorized recreationist, snowmobilers, motorcyclists, ATV users, environmentally-oriented groups, outfitters, some adjacent landowners, some livestock operators, and religious traditionalists) would be permanently displaced from the area with *alternatives A2, B2, and C2*.

Attitudes, beliefs and values would be as discussed for the Chevron Project (See Section IV.1.N.).

Changes to the local social organization would be most likely to occur with a full field production. The amount of change would be dependent upon the extent of the gas and oil resource.

O. HEALTH AND SAFETY

Several concerns related to health and safety issues were expressed during the scoping process. The concerns identified during the scoping process included: 1) The potential for traffic hazards (vehicle and helicopter), and 2) The potential and effects of an accidental release of hydrogen sulfide or other hazardous gases. This section discusses the health and safety concerns expressed by the public in relation to oil and gas exploration and production.
Mitigation measures that would be needed to minimize the effects are discussed where applicable.

Exploration Proposal

a. Road Use and Public Safety

Alternatives A2, B2, and C2, could create a slight increase in traffic delays and vehicle encounters on US Highway 2, from project vehicles entering and leaving US Highway 2. There would be the potential for increased traffic through the community of East Glacier Park for the duration of the road construction and drilling project.

Alternative D1, would entail use of BIA 2 and the Dog Gun Lake on the Blackfeet Indian Reservation to the Forest boundary. Traffic would increase along these routes during the drilling period. There may be a traffic hazard where project vehicles entered or exited US Highway 2. Signing on US Highway 2 may be required.

An increase in road traffic on any road alternative could increase the potential for vehicle accidents or safety conflicts between pedestrians, equestrians and vehicles using the same roadways. Winter-time road use, or road use at times of the year when the roadbed was not be in ideal condition, could present inherent hazards to humans, and surface resources. Any road access alternatives would involve gate closures at strategic points as a means to prevent public travel conflicts with drilling activity. A possible mitigation measure to decrease the potential for traffic conflicts would be to have gate closures at strategic points within Forest Service lands.

Alternatives F8 and F9 could create a safety hazard due to noise from overflights, equipment malfunction or a helicopter mishap. Recreationists using pack animals, or on horseback could be concerned that helicopter over-flights and associated noise would cause disruption among a pack string or to a rider's horse, and could result in personal or animal injury. Helicopter over-flights could be routed to avoid heavily used trails and recreation areas. The carrying of heavy loads slung beneath the helicopter would be a potential hazard to Forest users. In the event of equipment malfunction, a load may have to be released in flight. Safety records by companies conducting this type of work in other areas has been extremely good (Lazzaretti, 1986).

The use of helicopters, to transport drill crews and other personnel to and from the drill site could cause a safety problem in the event of an emergency evacuation is required. In adverse weather conditions, flights for emergency medical assistance could be postponed or carried out at greater than normal risk of flight mishap.

While helicopter operations have a record of safe and efficient operations, alternatives F8 and F9 would present additional safety concerns for the operator. It could be difficult to bring in immediate medical help in poor flying conditions. In the event of a blowout, there could be a significant delay to bring the blowout under control. These alternatives would also present access difficulties and additional expense for routine BLM and Forest Service inspections of operations.

b. Accidental Blowouts

Fina's proposal involves drilling into a geological environment that has the potential to contain hydrogen sulfide, a potentially dangerous gas. For a discussion on hydrogen sulfide and well blowouts, see Chevron Project Section IV.1.O.b. and Fina project Section IV.2.C.

Fina has prepared a hydrogen sulfide contingency plan for their proposed project that outlines safety plans and emergency procedures for personnel and the general public in the event of equipment failures, and/or disaster, when formations that could contain toxic gases were being drilled (see Appendix B).

In the event of an hydrogen sulfide escape, several trails in the vicinity of the well site would be closed to public travel until the escape is controlled and eliminated. These trails include portions of trails 101, 118, 138, 140, and 131. These closures are based on a 15 parts per million exposure level at a 2 mile distance from the well site. Air quality monitoring equipment would be placed on downwind trails from the source to monitor exposure levels to assure adequate closures.

Alternative E (no action) would cause no change, and would have no effects.

Reasonably Foreseeable Actions

A Dry Hole

It is anticipated that Fina may drill a second hole, should the first hole prove to be dry. To drill the second hole, it is likely that Fina would set up in a different location. This would increase the duration of effects incurred while drilling the first hole. The health and safety effect would be similar to that for drilling the first dry hole, but for a longer duration of time.

A One Well Production

Production concerns include leakage from pipelines or the wellbore, which could cause health concerns from hazardous gases. Some liquids could be separated at the wellhead, thereby eliminating their transport via pipeline. Depending on the size of leak and gases present, the hazard potential could be extensive or minor. Many of the reported incidents involving hazardous exposures to hydrogen sulfide are related to malfunctions in pipe fittings or at gas processing plants. Close wellhead and pipeline monitoring would be mandatory to ensure public and resource safety.

Alternatives 8 and 9 would require construction of road access for service and maintenance of the well site. Thus, any effects for these alternatives would be the same as those for the roaded alternatives.

The amount of vehicle traffic on the access road for the roaded alternatives would decrease from the traffic associated with drilling and construction. Therefore, the risk of vehicle accidents would probably decrease. After a production history has been established for the well, it is possible that regular trips to the well site may be decreased significantly. Remote monitoring may facilitate even fewer trips.

The risk of a blowout from a producing well is low due to installation of the wellhead which checks pressure buildups. Inspections would be needed periodically, as well as remote monitoring devices during production to monitor for any leaks in the wellhead or pipelines. The effects of any release of toxic gas would be similar to those discussed under the exploration proposal. See also the discussion for the Chevron Project, Section IV.1.O.

No sweetening plant was proposed by Fina. An analysis of possible facility siting areas (Appendix L), has outlined the preliminary suitability of areas in and around the RM-1 Unit for production facilities. An environmental analysis would be conducted should there be a producing well.

A Field Production

Development of a well field would generate considerable activity during the drilling and construction phases. The amount of increase in activity would be dependent upon well locations and the amount and type of production from the wells.

With *Alternatives A2, B2, and C2*, an increase in traffic delays and vehicle encounters on US Highway 2 would continue, as would the vehicles entering and exiting the Highway. There would be the potential under these alternatives for increased traffic through the community of East Glacier Park. The most traffic would occur while the field was being established and during pipeline construction.

With *Alternative D1*, traffic would also increase on BIA 2 and the Dog Gun Lake road with the potential for automobile accidents. The amount of traffic could decrease following completion of drilling and pipeline construction. Road use restrictions to the public would reduce traffic conflicts and maintain safe conditions.

While drilling and placing additional wells in production, the risk of a blowout would be increased slightly. The potential for a blowout to occur would be better known after the first well was completed. Precautions to prevent or control the potential for blowouts would be followed by the proponent.

Additional information on hydrogen sulfide and other gases is found in Section IV.2.C.-Air Quality.

3. ANALYSIS OF ALTERNATIVE COMBINATIONS

From the scoping process, it was determined that the potential combined effects of the Chevron and Fina projects occurring simultaneously or in sequence should be analyzed. This section discloses the ID Team's analysis of possible effects of allowing both projects to proceed simultaneously or in sequence. The discussion is organized by major issue, and addresses effects that are likely to occur under the various Chevron/Fina alternative combinations.

The combined alternative effects are summarized and compared in Table 4.22, which includes mitigation that may be applied to reduce or eliminate any adverse effects. The mitigation that would be applied for the individual projects as described in Sections IV.1 (Chevron) and IV.2 (Fina) would be applicable to the combined projects and is not reiterated in this section. The effectiveness of the mitigation is discussed where applicable. Residual effects of the alternative combinations (effects that can not be effectively mitigated) are summarized in Table 2.5.

There were 70 possible alternative combinations that could occur for the two projects. Only 33 are analyzed for combined effects. The rationale for the elimination of the remaining 37 is discussed in Chp.II.3.

The following discussion discloses anticipated effects responsive to the various issues. It also elaborates on the rationale for the comparison items used in Table 4.22.

Oil and Gas Exploration and Development

The effects on oil and gas exploration and development that are interrelated in alternative combinations are based primarily on costs to the companies. The cost of road construction is reduced to the companies when alternatives that share portions of the access road are examined. Individual project costs for road construction, drilling cost, and reclamation range from $14,800,000 to $15,900,000 for any of the roaded combinations. If access to one or both sites by helicopter is involved, the combined project price would range from $21,000,000 to $28,400,000.

Water Resources/Fisheries

Sediment yield is the only effect on water resources that may involve combined effects between the Chevron and Fina projects. For example, if there was an increase in sediment yield into the South Fork Two Medicine River from one of the Chevron alternatives and from one of the Fina alternatives, a combined downstream effect may occur. Other effects would be a result of possible accidental spill or of water use, neither of which are interrelated between the two projects.

Table 4.22 compares sediment yields of Chevron (C), Fina (F), and Chevron/Fina (C/F) combined. These effects are displayed as estimated total tons (T) increase in sediment yield resulting from proposed roads. In alternatives where road segments are common to both projects, sediment yields are less than alternatives that are distinct to the project because of the shared portions of a road. These totals are convenient for comparison between alternative sets but do not indicate the impact on any one drainage.

A risk factor of *high*, *moderate*, or *low* was assigned to alternatives combinations to denote the degree of impact that could occur if road construction was taking place and a high intensity thunder storm occurred to produce sediment from exposed road cuts, fills, and running surfaces.

The comparison of combined effects for fisheries in Table 4.22 indicates whether the sediment produced by the project is in separate drainages or the same drainage and separated by some distance, and whether or not fishing pressure would be increased to all of the South Fork Two Medicine River, the north end of South Fork Two Medicine River, or just the headwaters of the South Fork Two Medicine River.

Air Quality

The effects on air quality are dust and emissions from road construction and use. Hazardous gases are addressed below in the Health and Safety section. The greatest effect on air quality, if the projects were to occur simultaneously, would be within the northwestern portion of the RM-1 Unit and 1-2 miles south of US Highway 2 where portions of access would be shared. The effect would be one of higher concentrations of fugitive dust and emissions in the air when roads in the area are shared rather than separated. Table 4.22 indicates whether access is shared and if the concentration would be higher or lower.

Access Management

The combined effects on access are discussed in Table 4.22. Discussion focuses on number of miles of shared road use that is associated with alternative combinations.

Glacier National Park and Adjacent Wilderness

The only combined effects that are compared in Table 4.22 are noise levels. All other effects; air quality, wildlife, and visual are discussed under those separate issues. Noise levels discussed in table 4.22 are compared against the existing background noises that are associated with the present noise level from the Burlington Northern Railroad and traffic on US Highway 2. Noise level effects indicate: 1) whether a new noise would be introduced, or 2) whether one or both projects would add to the existing background noises.

Badger-Two Medicine Roadless Area

There are no combined effects between the two projects. The Chevron project is the only one that lies within the roadless area. For these effects see Section IV.1.F.

Wildlife

The discussion of effects in Table 4.22 focuses on three main concerns: 1) The combined acres for both projects of seasonal ranges affected by the zone of influence of the road and well site, 2) The relative impacts to migration corridors, and 3) The extent of the separation of projects to allow animals to be displaced without encountering the other project. Impacts to the Summit migration corridor will be considerable due to activity within this corridor from one or both projects. The area of displacement that may be affected by project separation is discussed for the Northwest portion of the RM-1 Unit. This is the area that is between US Highway 2 and a line if drawn from Flattop Mountain through the Fina well site (see Map 2.8).

Vegetation

There are no major combined effects on vegetation between the two projects. The reader is referred to the separate vegetation sections for each project to determine effects to vegetation.

Outdoor Recreation

The major effects to the recreation resource in the RM-1 Unit would be to trail users, developed campgrounds, snowmobile play areas, outfitter and guides, and hunters. Impacts to the trail system are compared in Table 4.22 by the number of miles of trail that would be overlain by road construction for the combined alternatives, and the effects on the Two Medicine-Elk Calf Mountain National Recreation Trail. Effects to outfitters and guides are compared by stating whether or not their business would need to be relocated to offer their clientele a back-country experience with a minimum amount of disturbance. Developed campgrounds and snowplay areas are compared using a *high* vs *low* amount of disturbance in close proximity to these areas.

Visual Resources

The combined effects on the visual resource will occur from viewpoints along the Two-Medicine-Elk Calf Mountain National Recreation Trail (NRT) and the Autumn Creek Trail in Glacier National Park. The effects discussed in Table 4.22 indicate whether or not a change in the landscape would be visible in relation to the construction of a road or a well site. A comparison is made when one or both projects is seen from the viewpoints. Effects on the Continental Divide National Scenic Trail are not discussed in Table 4.22, but would be similar to effects described for the Two Medicine-Elk Calf Mountain National Recreation Trail.

Blackfeet Indian Traditional Culture and Religion

Both the Chevron and Fina proposals are unequivocally opposed by the Blackfeet traditionalists. The traditionalists have stated that they see no differences between the proposals, including locations, timing windows, or kind of work being undertaken at any time. Using this premise, it appears that simultaneous occurrence of both the Chevron and Fina proposals would have a greater adverse effect on traditional culture and religious practices than any single drilling project, regardless of which alternative combinations are selected.

Archaeological Resources

Potential effects to archaeological resources are regarded as site specific and happening on a one-time occurrence basis. Activity occurring in one project area would not have an effect on the other project area.

Blackfeet Reserved Rights

There would be no combined effects on the Blackfeet Reserved Rights if these wells are permitted to take place at the same time.

Socioeconomics

If drilling of the Chevron well occurs at the same time as the Fina well is drilled, about 60 workers would be associated with two drilling operations. Approximately 20 of these workers could be hired locally. Local expenditures for goods and services for the combined projects would range from $4.3-5.2 million dollars. It is anticipated that the number of jobs related to expenditures for goods and services in the regional area for the combined projects would range from 115 with helicopter access to 160 with road access. These increases in employment opportunities would cause in-migration of temporary workers for the drill rig crew, tool pushers and mud loggers while jobs in construction, transportation, oil/gas services and retail trade would benefit the existing service sector and not provide many new jobs. Employment impacts to communities would depend on whether crew camps are established at the wellsites. If crew camps are not used, it is assumed that most of the workers would seek lodging as close to the work site areas as possible.

East Glacier Park and Browning could experience short-term changes in employment, population, and housing demand during exploration. Those impacts would occur during the drilling operations when temporary workers could reside in those communities. It is anticipated that the short term population increase would range from 2-16% in East Glacier Park and 0-8% in Browning.

Exploration involves relatively few personnel and they spend only a limited time in the area. Employees are often single or unaccompanied by dependents, reside in transient facilities, and eat in local restaurants. Housing demand would be short-term, during the drilling timeframe, but could displace tourists looking for accommodations during the summer months. It is anticipated that there would be a need of 4-60 temporary housing units in East Glacier Park and 4-10 units in Browning.

Local residents could expect less than a 2% increase in personal earnings as a result of drilling operations.

The above-mentioned socioeconomic effects are very similar, no matter which combination of alternatives is selected. Therefore, there will be no further discussion of effects by a given alternative combination in Table 4.22.

Health and Safety

The combined project effects are displayed in Table 4.22 by alternative combination with respect to whether or not there would be a higher or lower risk for accidents associated with entry and exit of US Highway 2 and on BIA Road No.2. When combinations of alternatives increase the number of vehicles on the road, the potential for accidents increases. Effects of blowouts, release of hydrogen sulfide and other gases would not constitute interrelated effects because the well sites are located sufficiently apart that any accidental release and resulting effects would not overlap with the other. The probability of an accidental blowout from both wells is 0.06% (Livermore, 1986), or less than one chance in 1,600. Furthermore, the probability of a simultaneous blowout if both wells were being drilled during the same time period is extremely remote.

Introduction to Table 4.22

Table 4.22 is organized by alternative combination for those combinations determined to have potential effects. These combinations are discussed for the issues that have been identified above. For example, alternative combination *1A/C2* is an analysis of *Chevron alternative 1A* and *Fina alternative C2*. A short description of the alternative route is given in abbreviated form; Chevron alternative 1A is along the South Fork of the Two Medicine River and Fina alternative C2 is along Pike Creek road. Numerous abbreviations are used in Table 4.22 to reduce verbage and to make maximum use of limited space. These abbreviations are defined below.

Mitigation measures and their effectiveness are discussed where applicable for each alternative combination. Any mitigation that would be applied for the projects on an individual basis would also be applicable to the combined projects and is not reiterated in Table 4.22. Residual unmitigated effects are summarized in Table 2.5.

Discussion of the "no action" alternatives is not included for comparison in Table 4.22. Effects are as described in Sections IV.1. (Chevron) and IV.2. (Fina).

Definitions for Table 4.22

O&G	Oil and Gas
MM	millions of dollars
C	Chevron
btm	bottom
F	Fina
S Fk Two Med	South Fork of Two Medicine River
C/F	Chevron/Fina
mi	miles
A	acres
GNP	Glacier National Park
NRT	Two Medicine-Elk Calf Mountain National Recreation Trail
NW	northwest

Table 4.22

Summary of Effects and Mitigation for Chevron and Fina Alternative Combinations Analyzed in Detail

1A/C2 S FK TWO MED (btm)/PIKE CREEK	1A/D1 S FK TWO MED (btm)/DEEP CREEK
O&G EXPLORATION: $14.8MM combined cost for road construction and drilling; **WATER/FISHERIES**: Sediment yield: C=13.9T, F=1.9T, C/F=14.5T. A moderate risk of sedimentation to S Fk Two Med because activity would occur in same drainage. Increased fishing pressure on all S Fk Two Med due to access for both projects in same drainage; **AIR**: Where access is shared, there would be higher concentrations of dust and emissions. **ACCESS**: 3.9mi of shared access; **GNP-NOISE**: Both projects add to background noise levels; **WILDLIFE**: Combined seasonal ranges affected = 15,502A. Entire Summit migration corridor would be affected by the combined projects. No area for wildlife displacement in NW portion of RM-1 unit due to project overlap; **RECREATION**: 12.5 mi of trail would be overlain by road; 6 mi of NRT would be overlain by road; Relocate 2 outfitter operations outside of of RM-1 unit. High disturbance to Summit campground and snowmobile routes; **VISUAL**: Both projects seen from viewpoints on NRT; **HEALTH & SAFETY**: Higher risk for vehicle accidents on US Hwy 2.	**O&G EXPLORATION**: $15.9MM combined cost for road construction and drilling; **WATER/FISHERIES**: Sediment yield-C=13.9T, F=3.1T, C/F=17.0T. A low risk of sedimentation to S Fk Two Med due to activity in different drainages; Low combined risk of fishing pressure; **AIR**: Access not shared so lower concentrations of dust and emissions; **ACCESS**: None shared; **GNP-NOISE**: One project adds to background levels; **WILDLIFE**: Combined seasonal ranges affected = 16,402A; Entire Summit migration corridor affected by one project; Some of NW portion of RM-1 unit unavailable for wildlife displacement due project overlap; **RECREATION**: 12.3 mi of trail would be overlain by road; 6 mi of NRT would be overlain by road; Relocate 2 outfitter operations outside of of RM-1 unit; High disturbance to Summit Campground and snowmobile routes; **VISUAL**: One project seen from viewpoints on NRT; **HEALTH & SAFETY**: Lower risk for vehicle accidents on US Hwy 2.
MITIGATION: Use of an 8 1/2 and 5 month window of operationfor Chevron and Fina, respectively, will reduce effects of combined project activity on wildlife seasonal ranges to 8759A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost from project-related displacement and present motorized use on trails. Trail closures will eliminate 32 miles of trail from motorized use. Disallowing projects to take place concurrently will reduce the risk of sedimentation from moderate to low, and will make more trails available for motorized use.	**MITIGATION**: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina, respectively, will reduce the effect on wildlife seasonal ranges to 9269A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost from project-related displacement and present motorized use on trails. Trail closures will eliminate 32 miles of trail from motorized use. Disallowing projects to take place concurrently will make more trails available for motorized use.

Table 4.22 (continued)

1B/B2 S FK TWO MED (btm)/TRAIL HEAD	**1B/D1 S FK TWO MED (btm)/DEEP CREEK**
O&G EXPLORATION: $15.0MM combined cost for road construction and drilling; **WATER/FISHERIES**: Sediment yield: C=15.0T, F=3.1T, C/F=18.1T. A moderate risk of sedimentation to S Fk Two Med due to activity in same drainage. Increased fishing pressure on S Fk Two Med due to activity in same drainage; **AIR**: Shared access, therefore higher concentrations of dust and emissions. **ACCESS**: 3.3mi of shared access; **GNP-NOISE**: Both projects add to background levels; **WILDLIFE**: Combined seasonal ranges affected = 14,212A. East half of Summit migration corridor affected by both projects. No area for wildlife displacement in NW portion of RM-1 unit; **RECREATION**: 12.5 mi of trail would be overlain by road, 6 mi of NRT would be overlain by road. Relocate 2 outfitter operations outside of of RM-1 unit. Low disturbance to Summit Campground but high disturbance to snowmobile routes; **VISUAL**: Both projects would be seen from viewpoints on NRT; **HEALTH & SAFETY**: Higher risk for vehicle accidents on US Hwy 2. **MITIGATION**: An 8 1/2 month and 5 month window of operation for Chevron and Fina, respectively, will reduce the combined impacts on wildlife seasonal ranges to 9234A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost from project-related displacement and present motorized use on trails. Trail closures will eliminate 32 miles of trail from motorized use. Disallowing projects to take place concurrently will reduce the risk of sedimentation from moderate to low, and it will make more trails available for motorized use.	**O&G EXPLORATION**: $15.9MM combined cost for road construction and drilling; **WATER/FISHERIES**: Sediment yield-C=15.0T, F=3.1T, C/F=18.1T. A low risk of sedimentation to S Fk Two Med due to activity in different drainages. Increased fishing pressure on S FK Two Med from one project; **AIR**: Access not shared so there would be lower concentrations of dust and emissions; **ACCESS**: None shared; **GNP-NOISE**: One project adds to background levels; **WILDLIFE**: Combined seasonal ranges affected = 15,782A. East half of Summit migration corridor affected by one project. Area would be available for wildlife displacement except in NW portion of RM-1 unit; **RECREATION**: 12.3 mi of trail would be overlain by road, 6 mi of NRT overlain by road. Relocate 2 outfitter operations outside of of RM-1 unit. Low disturbance to Summit Campground but high disturbance to snowmobile routes; **VISUAL**: One project seen from viewpoints on NRT. Both projects seen from Autumn Creek Trail; **HEALTH & SAFETY**: Lower risk for vehicle accidents on US Hwy 2. **MITIGATION**: An 8 1/2 month and 5 month window of operation for Chevron and Fina, respectively, will reduce impacts on wildlife seasonal ranges to 9344A. Road and trail closures will maintain fishing pressure at or below present levels and regain habitat lost from project-related displacement and present motorized use on trails. Trail closures will eliminate 32 miles of trail from motorized use. Disallowing projects to take place concurrently will make more trails available for motorized use.

Table 4.22 (continued)

6A/A2 S FK TWO MED (west)/FALSE SUMMIT	6A/C2 S FK TWO MED (west)/PIKE CREEK	6A/D1 S FK TWO MED (west)/DEEP CREEK
O&G EXPLORATION: $15.3MM combined cost for road construction and drilling; **WATER/ FISHERIES**: Sediment yield: C=11.3T, F=1.3T, C/F=12.6T. A high risk of sedimentation to S Fk Two Med because activity would be in same drainage. Increased fishing pressure on S Fk Two Med due to both projects in same drainage; **AIR**: Access not shared, lower concentrations of dust and emissions. **ACCESS**: None shared; **GNP-NOISE**: Both projects add to background levels; **WILDLIFE**: Combined seasonal ranges affected = 14,061A. Entire Summit migration corridor affected by both projects. No area for wildlife displacement in NW portion of RM-1 unit; **RECREATION**: 1.2 mi of trail would be overlain by road, No overlap of road and NRT. Relocate 2 outfitter operations outside of of RM-1 unit. High disturbance to Summit Campground and snowmobile routes; **VISUAL**: One project seen from viewpoints on NRT; **HEALTH & SAFETY**: Lower risk for vehicle accidents on US Hwy 2.	**O&G EXPLORATION**: $15.1MM combined cost for road construction and drilling; **WATER/ FISHERIES**: Sediment yield-C=11.3T, F=1.9T, C/F=17.5T. A moderate risk of sedimentation to S Fk Two Med due to activity in same drainage. Increased fishing pressure on S Fk Two Med due to both projects in same drainage; **AIR**: Higher concentrations of dust and emissions where access is shared. **ACCESS**: 1.5mi of shared access; **GNP-NOISE**: Both projects add to background levels; **WILDLIFE**: Combined seasonal ranges affected = 14,861A. Entire Summit migration corridor affected by both projects. No area for wildlife displacment in NW portion of RM-1 unit; **RECREATION**: 1.2 mi of trail would be overlain by road, 0 mi of NRT overlain by road. Relocate 2 outfitter operations outside of of RM-1 unit. High disturbance to Summit Campground and snowmobile routes; **VISUAL**: Both projects seen from viewpoints on NRT; **HEALTH & SAFETY**: Higher risk for vehicle accidents on US Highway 2.	**O&G EXPLORATION**: $15.6MM combined cost for road construction and drilling; **WATER/ FISHERIES**: Sediment yield-C=11.3T, F=3.1T, C/F=14.4T. A low risk of sedimentation to S Fk Two Med due to project activity in different drainages. Increased fishing pressure from one project on S FK Two Med; **AIR**: Access not shared so lower concentrations of dust and emissions; **ACCESS**: None shared; **GNP-NOISE**: One project adds to background levels; **WILDLIFE**: Combined seasonal ranges affected = 15,761A. Entire Summit migration corridor affected by one project. Most of NW portion of RM-1 unit would be available for wildlife displacement; **RECREATION**: 1.0 mi of trail would be overlain by road, 0 mi of NRT overlain by road. Relocate 2 outfitter operations outside of of RM-1 unit. High disturbance to Summit Campground and snowmobile routes; **VISUAL**: One project seen from viewpoints on NRT. Both projects seen from Autumn Creek Trail; **HEALTH & SAFETY**: Lower risk for vehicle accidents on US Highway 2.
MITIGATION: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina, respectively, will reduce the combined effects on wildlife seasonal ranges to 6915A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost from project-related displacement and present motorized use on trails. Trail closures will eliminate 32 miles of trail from motorized use. Disallowing projects to take place concurrently will reduce the risk of sedimentation from high to low and make more trails available for motorized use.	**MITIGATION**: Use of an 8 1/2 and 5 month operation for Chevron and Fina, respectively, will reduce the combined effect on wildlife seasonal ranges to 7915A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost from project-related displacment and present motorized use. Trail closures will eliminate 32 miles of trail from motorized use. Disallowing projects to take place concurrently will reduce the risk of sedimentation from moderate to low, and make more trails available for motorized use.	**MITIGATION**: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina respectively will reduce the combined effect on wildlife seasonal ranges to 7425A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost from project-related displacement and present motorized use on trails. Trail closures eliminate 32 miles of trail from motorized use. Disallowing projects to take place concurrently will make more trails available for motorized use.

Table 4.22 (continued)

6B/A2 S FK TWO MED (west)/FALSE SUMMIT	6B/B2 S FK TWO MED (west)/TRAIL HEAD	6B/D1 S FK TWO MED (west)/DEEP CREEK
O&G EXPLORATION: $15.3MM combined cost for road construction and drilling; **WATER/ FISHERIES**: Sediment yield: C=12.9T, F=1.3T, C/F=14.2T. A high risk of sedimentation to S Fk Two Med due to project activity in same drainage. Increased fishing pressure on S Fk Two Med due to both projects in same drainage; **AIR**: Access not shared, lower concentrations of dust and emissions. **ACCESS**: None shared; **GNP-NOISE**: Both projects add to background levels; **WILDLIFE**: Combined seasonal ranges affected = 14,359A. Most of Summit migration corridor affected by one project. No area for wildlife displacement in NW portion of RM-1 unit; **RECREATION**:0.2 mi of trail would be overlain by road, 0 mi of NRT overlain by road. Relocate 2 outfitter operations outside of of RM-1 unit. Low disturbance to Summit Campground but high disturbance to snowmobile routes; **VISUAL**: One project seen from viewpoints on NRT; **HEALTH & SAFETY**: Lower risk for vehicle accidents on US Hwy 2.	**O&G EXPLORATION**: $15.2MM combined cost for road construction and drilling; **WATER/ FISHERIES**: Sediment yield: C=12.9T, F=3.1T, C/F=14.5T. A moderate risk of sedimentation to S Fk Two Med because activity would occur in same drainage. Increased fishing pressure on S Fk Two Med due to access for both projects in same drainage; **AIR**: Shared access, higher concentrations of dust and emissions. **ACCESS**: 2.2 mi of shared access; **GNP-NOISE**: Both projects add to background levels; **WILDLIFE**: Combined seasonal ranges affected = 14,489A. East 2/3 of summit corridor would be affected by the combined projects. No area for wildlife displacement in NW portion of RM-1 unit; **RECREATION**: 2 mi of trail would be overlain by road, 0 mi of NRT would be overlain by road. Relocate 2 outfitter operations outside of RM-1 unit. Low disturbance to Summit Campground but high disturbance to snowmobile routes; **VISUAL**: Both projects seen from viewpoints on NRT; **HEALTH AND SAFETY**: Higher risk for vehicle accidents on US Highway 2.	**O&G EXPLORATION**: $15.6MM combined cost for road construction and drilling; **WATER/ FISHERIES**: Sediment yield-C=12.9T, F=3.1T, C/F=16.0T. A low risk of sedimentation to S Fk Two Med due to sediment in different drainages. Increased fishing pressure from one project for entire S FK Two Med; **AIR**: Access not shared, lower concentrations of dust and emissions; **ACCESS**: None shared; **GNP-NOISE**: One project adds to background levels; **WILDLIFE**: Combined seasonal ranges affected = 16,059A. Most of Summit migration corridor affected by one project. Most of NW portion of RM-1 unit will be available for wildlife displacement; **RECREATION**: .2 mi of trail would be overlain by road, 0 mi of NRT overlain by road. Relocate 2 outfitter operations outside of of RM-1 unit. Low disturbance to Summit Campground but high disturbance to snowmobile routes; **VISUAL**: One project seen from viewpoints on NRT. Both projects would be viewed from Autumn Creek Trail; **HEALTH & SAFETY**: Lower risk for vehicle accidents on US Hwy 2.
MITIGATION: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina, respectively, will reduce impacts on wildlife seasonal ranges to 7447A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost from project-related displacement and present motorized use on trails. Trail closures will eliminate an additional 32 miles of trail from motorized use. Disallowing projects to take place concurrently will reduce the risk of sedimentation from high to low and make more trails available for motorized use.	**MITIGATION**: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina, respectively, will reduce impacts on wildlife seasonal ranges to 7847A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost from project-related displacement and present motorized use on trails. Trail closures will eliminate an addtional 32 miles from motorized use. Disallowing projects to take place concurrently will reduce the risk of sedimentation from moderate to low and make more trails available for motorized use.	**MITIGATION**: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina, respectively, will reduce impacts on wildlife seasonal ranges to 7957A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost due to project activity and present motorized use on trails. Trail closures will eliminate an additional 32 miles of trail from motorized users. Disallowing projects to take place concurrently will make more trails available for motorized use.

Table 4.22 (continued)

7A/C2 S FK TWO MED (east)/PIKE CREEK	7A/D1 S FK TWO MED (east)/DEEP CREEK
O&G EXPLORATION: $14.8MM combined cost for road construction and drilling; **WATER/FISHERIES**: Sediment yield: C=13.3T, F=1.9T, C/F=15.5T. A moderate risk of sedimentation to S Fk Two Med due to sedimentation in same drainage. Increased fishing pressure on S Fork Two Med due to projects in same drainage; **AIR**: Higher concentration of dust and emissions in areas of shared access. **ACCESS**: 3.9mi of shared access; **GNP-NOISE**: Both projects add to background levels; **WILDLIFE**: Combined seasonal ranges affected = 15,502A. Entire Summit migration corridor affected by both projects. No area for wildlife displacement in NW portion of RM-1 unit; **RECREATION**: 4.5 mi of trail would be overlain by road, 0 mi of NRT overlain by road. Relocate 2 outfitter operations outside of of RM-1 unit. High disturbance to Summit Campground and snowmobile routes; **VISUAL**: Both projects seen from viewpoints on NRT; **HEALTH & SAFETY**: Higher risk for vehicle accidents on US Highway 2. **MITIGATION**: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina, respectively, will reduce impacts on wildlife seasonal ranges to 8759A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost due to displacement from project activity and present motorized use on trails. Trail closures will eliminate an additional 32 miles of trail from motorized use. Disallowing projects to take place concurrently will reduce the risk of sedimentation from high to low and will make more trails available for motorized use.	**O&G EXPLORATION**: $15.3MM combined cost for road construction and drilling; **WATER/FISHERIES**: Sediment yield-C=13.3T, F=3.1T, C/F=16.4T. A low risk of sedimentation to S Fk Two Med due to activity in different drainages. Increased fishing pressure from one project for S FK Two Med; **AIR**: Access not shared so lower concentrations of dust and emissions; **ACCESS**: None shared; **GNP-NOISE**: One project adds to background levels; **WILDLIFE**: Combined seasonal ranges affected = 16,402A. Entire Summit migration corridor affected by one project. Most of NW portion of RM-1 unit would be available for wildlife displacement; **RECREATION**: 4.2 mi of trail would be overlain by road, 0 mi of NRT overlain by road. Relocate 2 outfitter operations outside of of RM-1 unit. High disturbance to Summit Campground and snowmobile routes; **VISUAL**: One project seen from viewpoints on NRT; **HEALTH & SAFETY**: Lower risk for vehicle accidents on US Highway 2. **MITIGATION**: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina, respectively, will reduce impacts on wildlife seasonal ranges to 9269A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost from project activity and present motorized use on trails. Trail closures will eliminate an additional 32 miles of trail from motorized use. Disallowing projects to take place concurrently will make more trails available for motorized use.

Table 4.22 (continued)

7B/B2 S FK TWO MED (east)/TRAIL HEAD	7B/D1 S FK TWO MED (east)/DEEP CREEK
O&G EXPLORATION: $15.1MM combined cost road construction and drilling; **WATER/FISHERIES**: Sediment yield: C=14.5T, F=3.1T, C/F=15.5T. A moderate risk of sedimentation to S Fk Two Med due to project activity in same drainage. Increased fishing pressure due to both projects on S Fk Two Med; **AIR**: Shared access so higher concentrations of dust and emissions. **ACCESS**: 3.3mi of shared access; **GNP-NOISE**: Both projects add to background levels; **WILDLIFE**: Combined seasonal ranges affected = 14,212A. East half of Summit migration corridor affected by both projects. No area for wildlife displacement in NW portion of RM-1 unit; **RECREATION**: 4.5 mi of trail would be overlain by road, 0 mi of NRT overlain by road. Relocate 2 outfitter operations outside of RM-1 unit. Low disturbance to Summit campground but high disturbance to snowmobile routes; **VISUAL**: Both projects seen from viewpoints on NRT; **HEALTH & SAFETY**: Higher risk for vehicle accidents on US Hwy 2.	**O&G EXPLORATION**: $15.7MM combined cost for road construction and drilling; **WATER/FISHERIES**: Sediment yield: C=14.5T, F=3.1T, C/F=17.6T. A low risk of sedimentation to S Fk Two Med due to project activity in different drainages. Increased fishing pressure due to only one project for entire S Fk Two Med; **AIR**: Access not shared, lower concentrations of dust and emissions; **ACCESS**: None shared; **GNP-NOISE**: One project adds to background levels; **WILDLIFE**: Combined seasonal ranges affected = 15,782A. East half of Summit migration corridor affected by one project. Most of NW portion of RM-1 unit available for wildlife displacement ; **RECREATION**: 4.3 mi of trail would be overlain by road, 0 mi of NRT overlain by road. Relocate 2 outfitter operations outside of RM-1 unit. Low disturbance to Summit Campground but high disturbance to snowmobile routes; **VISUAL**: One project seen from viewpoints on NRT. Both projects seen from Autumn Creek Trail; **HEALTH & SAFETY**: Lower risk for vehicle accidents on US Hwy 2.
MITIGATION: Use of 8 1/2 and 5 month operation for Chevron and Fina respectively will reduce impacts on wildlife seasonal ranges to 9234A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost due to project activity and present motorized use on trails. Trail closures will eliminate 32 miles of trail from motorized use. Disallowing projects to take place concurrently will reduce the risk of sedimentation from moderate to low, and it will make more trails available for motorized use.	**MITIGATION**: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina, respectively, will reduce impacts on wildlife seasonal ranges to 9344A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost due to project activity and present motorized use on trails. Trail closures will eliminate an additional 32 miles of trail from motorized use. Disallowing projects to take place concurrently will reduce the risk of sedimentation from moderate to low and make more trails available for motorized use.

Table 4.22 (continued)

2/A2 S FK TWO MED (west)/FALSE SUMMIT	2/B2 S FK TWO MED (west)/PIKE CREEK	2/C2 S FK TWO MED (west)/DEEP CREEK
O&G EXPLORATION: $15.1MM combined cost for road construction and drilling; **WATER/ FISHERIES**: Sediment yield: C=18.1T, F=1.3T, C/F=19.4T. A low risk of sedimentation to S Fk Two Med due to project activity in different drainages. Increased fishing pressure on north end of S Fk Two Med from one project; **AIR**: Access not shared so lower concentrations of dust and emissions. **ACCESS**: None shared; **GNP-NOISE**: One project adds to background levels; **WILDLIFE**: Combined seasonal ranges affected = 14,229A. Summit migration corridor partially affected by one project. Both projects would have ample area available for wildlife displacement; **RECREATION**: 3.5 mi of trail would be overlain by road, 0 mi of NRT overlain by road. Relocate 1 outfitter operation within the RM-1 unit. No disturbance to Summit Campground and snowmobile routes; **VISUAL**: No projects seen from viewpoints on NRT; **HEALTH & SAFETY**: Lower risk for vehicle accidents on US Hwy 2.	**O&G EXPLORATION**: $15.2MM combined cost for road construction and drilling; **WATER/FISHERIES**: Sediment yield: C=18.1T, F=3.1T, C/F=21.2T. A low risk of sedimentation to S Fk Two Med due to project activity in different drainages. Increased fishing pressure on north end of S Fk Two Med from one project; **AIR**: Access not shared so low concentrations of dust and emissions. **ACCESS**: None shared; **GNP-NOISE**: One project adds to background levels; **WILDLIFE**: Combined seasonal ranges affected = 14,357A. Most of Summit migration corridor affected by one project. Ample area available for wildlife displacement; **RECREATION**: 3.5 mi of trail would be overlain by road, 0 mi of NRT overlain by road. Relocate 1 outfitter operation within the RM-1 unit. Low disturbance to Summit Campground and snowmobile routes; **VISUAL**: One project seen from viewpoints on NRT; **HEALTH & SAFETY**: Lower risk for vehicle accidents on US Hwy 2.	**O&G EXPLORATION**: $15.2MM each project for each project for road construction and drilling; **WATER/FISHERIES**: Sediment yield-C=18.1T, F=1.9T, C/F=20.0T. A low risk of sedimentation to S Fk Two Med due to project activity in different drainages. Increased fishing pressure on north end S Fk Two Med from one project; **AIR**: Access not shared so lower concentrations of dust and emissions. **ACCESS**: None shared; **GNP-NOISE**: One project adds to background levels; **WILDLIFE**: Combined seasonal ranges affected = 15,027A. Entire Summit migration corridor affected by one project. Project separation allows for ample area for wildlife displacement; **RECREATION**: 3.5 mi of trail would be overlain by road, 0 mi of NRT overlain by road. Relocate 1 outfitter operation within the RM-1 unit. High disturbance to Summit Campground and snowmobile routes; **VISUAL**: One project seen from viewpoints on NRT; **HEALTH & SAFETY**: Lower risk for vehicle accidents on US Hwy 2.
MITIGATION: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina, respectively, will reduce impacts on wildlife seasonal ranges to 2092A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost due to project activity and present motorized use on trails. Trail closures will eliminate an additional 32 miles of trail from motorized use. Disallowing projects to take place concurrently will make more trails available for motorized use.	**MITIGATION**: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina, respectively, will reduce effects on wildlife seasonal ranges to 2492A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost from project activity and present motorized use on trails. Trail closures will eliminate an additional 32 miles of trail from motorized use. Disallowing projects to take place concurrently will make more trails available for motorized use.	**MITIGATION**: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina, respectively, will reduce effects on wildlife seasonal ranges to 3092A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost from project activity and present motorized use on trails. Trail closures will eliminate an additional 32 miles of trail from motorized users. Disallowing projects to take place concurrently will make more trails available for motorized use.

Table 4.22 (continued)

2/D1 S FK TWO MED (west)/FALSE SUMMIT	2/F8 S FK TWO MED (west)/PIKE CREEK	2/F9 S FK TWO MED (west)/DEEP CREEK
O&G EXPLORATION: $15.6MM combined cost for road construction and drilling; **WATER/ FISHERIES**: Sediment yield: C=18.1T, F=3.1T, C/F=21.2T. A low risk of sedimentation to S Fk Two Med due to project activity in different drainages. Increased fishing pressure from one project on north end of S Fk Two Med; **AIR**: Access not shared so lower concentrations of dust and emissions; **ACCESS**: None shared; **GNP-NOISE**: One project adds to background levels; **WILDLIFE**: Combined seasonal ranges affected = 15,927A. No effect on Summit migration corridor. Area available for wildlife displacement due to project separation; **RECREATION**: 3.5 mi of trail would be overlain by road, 0 mi of NRT overlain by road. Relocate 1 outfitter operation within the RM-1 unit. No disturbance to Summit Campground and snowmobile routes; **VISUAL**: No projects seen from viewpoints on NRT; **HEALTH & SAFETY**: No risk for vehicle accidents on US Hwy 2.	**O&G EXPLORATION**: $22.7MM combined cost for road construction and drilling; **WATER/FISHERIES**: Sediment yield: C=18.1T, F=0.0T, C/F=18.1T. A low risk of sedimentation to S Fk Two Med due to project activity in different drainages. Increased fishing pressure to headwaters of S Fk Two Med from one project; **AIR**: Access not shared so lower concentrations of dust and emissions; **ACCESS**: None shared; **GNP-NOISE**: Helicopter activity for F8 would add new noise to background levels; **WILDLIFE**: Combined seasonal ranges affected = 8,361A. Entire Summit migration corridor affected by one project. Access roads are separated no overlap in NW portion of RM-1 unit; **RECREATION**: 3.5 mi of trail overlain by road, 0 mi of NRT overlain by road. Relocate 1 outfitter operation within the RM-1 unit. High disturbance to Summit Campground and snowmobile routes by helicopter noise; **VISUAL**: One project seen from viewpoints on NRT; **HEALTH & SAFETY**: Lower risk for vehicle accidents on US Hwy 2.	**O&G EXPLORATION**: $24.9MM combined cost for road construction and drilling; **WATER/FISHERIES**: Sediment yield: C=18.1T, F=0.0T, C/F=18.1T. A low risk of sedimentation to S Fk Two Med due to project activity in different drainages. Increased fishing pressure on S Fk Two Med from one project; **AIR**: Access not shared so lower concentrations of dust and emissions; **ACCESS**: None shared; **GNP-NOISE**: One project adds helicopter sounds to background levels; **WILDLIFE**: Combined seasonal ranges affected = 15,161A. No effect on Summit migration corridor. No project overlap so wildlife displacment areas will be available; **RECREATION**: 2.5 mi of trail would be overlain by road, 0 mi of NRT overlain by road. Relocate 1 outfitter operation within the RM-1 unit. No disturbance to Summit Campground and snowmobile routes; **VISUAL**: No projects seen from viewpoints on NRT; **HEALTH & SAFETY**: No risk for vehicle accidents on US Hwy 2.
MITIGATION: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina respectively will reduce effects on wildlife seasonal ranges to 6519A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost from displacement due to project activity and present motorized use on trails. Trail closures will eliminate an additional 32 miles of trail from motorized use. Disallowing projects to take place concurrently will make more trails available for motorized use.	**MITIGATION**: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina, respectively, will reduce impacts on wildlife seasonal ranges to 7609A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost due to displacement from project activity and present motorized use on trails. Trail closures will eliminate an additional 32 miles of trail from motorized use. Disallowing projects to take place concurrently will make more trails available for motorized use.	**MITIGATION**: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina, respectively, will reduce impacts on wildlife seasonal ranges to 5959A. Road and trail closures will maintain fishing pressure at at or below present level and regain habitat lost from displacment from project activity and present motorized use on trails. Trail closures will eliminate an additional 32 miles from motorized use. Disallowing projects to take place concurrently will make more trails available for motorized use.

Table 4.22 (continued)

8/A2 S FK TWO MED (west)/FALSE SUMMIT	8/B2 S FK TWO MED (west)/PIKE CREEK	8/C2 S FK TWO MED (west)/DEEP CREEK
O&G EXPLORATION: $21.0MM combined cost for road construction and drilling; **WATER/ FISHERIES**: Sediment yield: C=0.0T, F=1.3T, C/F=1.3T. A low risk of sedimentation to S Fk Two Med due to one project in the drainage. Increased fishing pressure on north end S Fk Two Med from one project; **AIR**: Access not shared so lower concentrations of dust and emissions. **ACCESS**: None shared; **GNP-NOISE**: Both projects add to background levels plus helicopter noise added; **WILDLIFE**: Combined seasonal ranges affected = 11,184A. Entire Summit migration corridor affected by both projects. No area for wildlife displacement in NW portion of RM-1 unit; **RECREATION**: 1.0 mi of trail would be overlain by road, 0 mi of NRT overlain by road. Relocate 2 outfitter operations outside of of RM-1 unit. High disturbance to Summit Campground and snowmobile routes; **VISUAL**: One project seen from viewpoints on NRT; **HEALTH & SAFETY**: Lower risk for vehicle accidents on US Hwy 2. **MITIGATION**: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina respectively will reduce impacts on wildlife seasonal ranges to 5962A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost due to displacment ffrom project activity and present motorized use on trails. Trail closures will eliminatem an additional 32 miles of trail from motorized use. Disallowing projects to take place concurrently will reduce the risk of sedminetation from high to low and will make more trails available for motorized use.	**O&G EXPLORATION**: $21.0MM combined cost for road construction and drilling; **WATER/ FISHERIES**: Sediment yield: C=0.0T, F=3.1T, C/F=3.1T. A low risk of sedimentation to S Fk Two Med due to one project in drainage. Increased fishing pressure on north end of S Fk Two Med from one project; **AIR**: Shared access so higher concentrations of dust and emissions. **ACCESS**: 1.0mi of shared access; **GNP-NOISE**: Both projects add to background levels. Helicopter would be new noise; **WILDLIFE**: Combined seasonal ranges affected = 11,314A. Entire Summit migration corridor affected by both projects. No separation area for wildlife displacment in NW portion of RM-1 unit; **RECREATION**: 1.0 mi of trail would be overlain by road, 0 mi of NRT overlain by road. Relocate 2 outfitter operations outside of RM-1 unit. High disturbance to Summit Campground and snowmobile routes; **VISUAL**: Both projects seen from viewpoints on NRT; **HEALTH & SAFETY**: Higher risk for vehicle accidents on US Hwy 2. **MITIGATION**: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina respectively will reduce impacts on wildlife seasonal ranges to 6362A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost from project activity and present motorized use on trails. Trail closures will eliminate an additional 32 miles of trail not usable by motorized users. Disallowing projects to take place concurrently will make more trails available for motorized use.	**O&G EXPLORATION**: $21.0MM combined cost for road construction and drilling; **WATER/ FISHERIES**: Sediment yield: C=0.0T, F=1.9T, C/F=1.9T. A low risk of sedimentation to S Fk Two Med from one project in the drainage. Increased fishing pressure on north end S Fk Two Med due to one projects; **AIR**: None shared so lower concentrations of dust and emissions. **ACCESS**: 0.0mi of shared access; **GNP-NOISE**: Both projects add to background levels, helicopter sounds would be new; **WILDLIFE**: Seasonal ranges affected = 11,984A. Entire Summit migration corridor affected by both projects. No area for wildlife displacment in NW portion of RM-1 unit; **RECREATION**: 1.0 mi of trail would be overlain by road, 0 mi of NRT overlain by road. Relocate 2 outfitter operations outside of of RM-1 unit. High disturbance to Summit Campground and snowmobile routes; **VISUAL**: Both projects seen from viewpoints on NRT; **HEALTH & SAFETY**: Lower risk for vehicle accidents on US Hwy 2. **MITIGATION**: Use of an 8 1/2 and 5 month operation for Chevron and Fina respectively will reduce impacts on wildlife seasonal ranges to 6962A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost from project activity and from present motorized use on trails. Trail closures will eliminate an additional 32 miles from motorized use. Disallowing projects to take place concurrently will make more trails available for motorized use.

Table 4.22 (continued)

8/D1 S FK TWO MED (west)/FALSE SUMMIT	**8/F8 S FK TWO MED (west)/PIKE CREEK**	**8/F9 S FK TWO MED (west)/DEEP CREEK**
O&G EXPLORATION: $21.3MM combined cost for road construction and drilling; **WATER/ FISHERIES**: Sediment yield: C=0.0T, F=3.1T, C/F=3.1T. A low risk of sedimentation to S Fk Two Med since one access is primarily helicopter. No increase of fishing pressure on S Fk Two Med; **AIR**: Access not shared so low concentrations of dust and emissions; **ACCESS**: None shared; **GNP-NOISE**: Helicopter sounds would be additional and new sounds; **WILDLIFE**: Combined seasonal ranges affected = 12,884A. Entire summit corridor affected by one project. Some project overlap in NW portion of RM-1 Unit would reduce area for wildlife displacement; **RECREATION**: 1.7 mi of trail would be overlain by road, 0 mi of NRT overlain by road. Relocate 2 outfitter operations outside of of RM-1 unit. High disturbance to Summit Campground and snowmobile routes; **VISUAL**: One project seen from viewpoints on NRT. Both projects seen from Autumn Creek Trail; **HEALTH & SAFETY**: Lower risk for vehicle accidents on US Hwy 2.	**O&G EXPLORATION**: $28.4MM combined cost for road construction and drilling; **WATER/ FISHERIES**: Sediment yield: C=0.0T, F=0.0T, C/F=0.0T. No risk of sedimentation to S Fk Two Med. No increase in fishing pressure; **AIR**: Access shared, higher concentrations of dust and emissions; **ACCESS**: Shared; **GNP-NOISE**: Both projects add to background levels plus new helicopter noise; **WILDLIFE**: Combined seasonal ranges affected = 15,318A. Entire Summit migration corridor affected by both projects. Some project overlap in NW portion of RM-1 from staging area and Fina well would reduce area available for wildlife displacement; **RECREATION**: 0 mi of trail overlain by road, 0 mi of NRT overlain by road. Relocate 2 outfitter operations outside of of RM-1 unit. High disturbance to Summit Campground and snowmobile routes; **VISUAL**: Both projects seen from viewpoints on NRT; **HEALTH & SAFETY**: Higher risk for vehicle accidents on US Hwy 2.	**O&G EXPLORATION**: $28.6MM combined cost for road construction and drilling; **WATER/FISHERIES**: Sediment yield: C=0.0T, F=0.0T, C/F=0.0T. No risk of sedimentation to S Fk Two Med. No increase in fishing pressure on S FK Two Med; **AIR**: Access not shared, lower concentrations of dust and emissions; **ACCESS**: None shared; **GNP-NOISE**: One project adds to background levels and new helicopter noise; **WILDLIFE**: Combined seasonal ranges affected = 12,118A. Entire Summit migration corridor affected by one project. Some project overlap in NW portion of RM-1 from staging area and Fina well reduces area for wildlife displacement ; **RECREATION**: 0 mi of trail would be overlain by road, 0 mi of NRT overlaid by road. Relocate 2 outfitter operations outside of of RM-1 unit. High disturbance to Summit Campground and snowmobile routes; **VISUAL**: One project seen from viewpoints on NRT; **HEALTH & SAFETY**: Lower risk for vehicle accidents on US Hwy 2.
MITIGATION: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina respectively will reduce impacts on wildlife seasonal ranges to 6472A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost due to displacement from project activity and present motorized use on trails. Trail closures will eliminate an additional 32 miles of trail from motorized use. Disallowing projects to take place concurrently will make more trails available for motorized use.	**MITIGATION**: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina respectively will reduce impacts on wildlife seasonal ranges to 7425A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost from proposed activity and present motorized use on trails. Trail closures will eliminate an additional 32 miles of trail not usable by motorized users. Disallowing projects to take place concurrently will make more trails available for motorized use.	**MITIGATION**: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina respectively will reduce impacts on wildlife seasonal ranges to 5912A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost from displacement from proposed activity present motorized use on trails. Trail closures will eliminate an additional 32 miles of trail from motorized use. Disallowing projects to take place concurrently will make more trails available for motorized use.

Table 4.22 (continued)

9/A2 S FK TWO MED (west)/FALSE SUMMIT	9/B2 S FK TWO MED (west)/PIKE CREEK	9/C2 S FK TWO MED (west)/DEEP CREEK
O&G EXPLORATION: $20.9MM combined cost for road construction and drilling; **WATER/FISHERIES**: Sediment yield: C=0.0T, F=1.3T, C/F=1.3T. A low risk of sedimentation to S Fk Two Med due to one project in the drainage. Increased fishing pressure on N end of S Fk Two Med from one project; **AIR**: Access not shared so lower concentrations of dust and emissions. **ACCESS**: None shared; **GNP-NOISE**: One project adds to background levels; **WILDLIFE**: Combined seasonal ranges affected = 13,272A. Summit migration corridor not affected. All NW portion of RM-1 unit available for wildlife displacment;**RECREATION**: 1.0 mi of trail would be overlain by road, 0 mi of NRT overlain by road. Relocate 1 outfitter operation within the RM-1 unit. No disturbance to Summit Campground and snowmobile routes; **VISUAL**: No projects seen from viewpoints on NRT; **HEALTH & SAFETY**: Lower risk for vehicle accidents on US Hwy 2.	**O&G EXPLORATION**: $21.0MM combined cost for road construction and drilling; **WATER/FISHERIES**: Sediment yield: C=0.0T, F=3.1T, C/F=3.1T. A low risk of sedimentation to S Fk Two Med due to one project in the drainage. Increased fishing pressure due to one project on N end of S Fk Two Med; **AIR**: Access not shared, lower concentrations of dust and emissions. **ACCESS**: None shared; **GNP-NOISE**: One project adds to background levels; **WILDLIFE**: Seasonal ranges affected = 13,402A. Most of Summit migration corridor affected by one project. All NW portion of RM-1 available for wildlife displacement; **RECREATION**: 1.0 mi of trail would be overlain by road, 0 mi of NRT overlain by road. Relocate 1 outfitter operation within the RM-1 unit. Low disturbance to Summit Campground but high disturbance to snowmobile routes; **VISUAL**: One project seen from viewpoints on NRT; **HEALTH & SAFETY**: Lower risk for vehicle accidents on US Hwy 2.	**O&G EXPLORATION**: $21.0MM combined cost for road construction and drilling; **WATER/FISHERIES**: Sediment yield: C=0.0T, F=1.9T, C/F=1.9T. A low risk of sedimentation to S Fk Two Med due to one project in drainage. Increased fishing pressure on N end of S.Fork Two Med due to one project; **AIR**: Access not shared so lower concentrations of dust and emissions. **ACCESS**: None shared; **GNP-NOISE**: One project adds to background levels; **WILDLIFE**: Combined seasonal ranges affected = 14,072A. Entire Summit migration corridor affected by one project. Entire NW portion of RM-1 available for wildlife displacement; **RECREATION**: 1.0 mi of trail would be overlain by road, 0 mi of NRT overlain by road. Relocate 1 outfitter operations within the RM-1 unit. High disturbance to Summit Campground and snowmobile routes; **VISUAL**: One project seen from viewpoints on NRT; **HEALTH & SAFETY**: Lower risk for vehicle accidents on US Hwy 2.
MITIGATION: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina respectively will reduce impacts on wildlife seasonal ranges to 4891A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost due to displacment from project activity and present motorized use on trails. Trail closures will eliminate an additional 32 miles of trail from motorized use. Disallowing projects to take place concurrently will make more trails available for motorized use.	**MITIGATION**: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina respectively will reduce impacts on wildlife seasonal ranges to 5291A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost from displacement from project activity and present motorized use on trails. Trail closures will eliminate an additional 32 miles of trail from motorized use. Disallowing projects to take place concurrently will make more trails available for motorized use.	**MITIGATION**: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina respectively will reduce impacts on wildlife seasonal ranges to 5891A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost from displacement from project activity and present motorized use on trails. Trail closures will eliminate an additional 32 miles of trail not usable by motorized users. Disallowing projects to take place concurrently will make more trails available for motorized use.

Table 4.22 (continued)

9/D1 S FK TWO MED (west)/FALSE SUMMIT	9/F8 S FK TWO MED (west)/PIKE CREEK	9/F9 S FK TWO MED (west)/DEEP CREEK
O&G EXPLORATION: $21.4MM combined cost for road construction and drilling; **WATER/ FISHERIES**: Sediment yield-C=0.0T, F=3.1T, C/F=3.1T. No risk of sedimentation to S Fk Two Med. No increase in fishing pressure on S Fk Two Med; **AIR**: Access not shared so lower concentrations of dust and emissions; **ACCESS**: None shared; **GNP-NOISE**: One project adds to background levels; **WILDLIFE**: Combined seasonal ranges affected = 14,972A. No effect on Summit migration corridor. All NW portion of RM-1 available for wildlife displacement; **RECREATION**: 0.8 mi of trail would be overlain by road, 0 mi of NRT overlain by road. Relocate 1 outfitter operation within the RM-1 unit. No disturbance to summit campground and snowmobile routes; **VISUAL**: No projects seen from viewpoints on NRT; **HEALTH & SAFETY**: No risk for vehicle accidents on US Hwy 2.	**O&G EXPLORATION**: $28.4MM combined cost for road construction and drilling; **WATER/ FISHERIES**: Sediment yield-C=0.0T, F=0.0T, C/F=0.0T. No risk of sedimentation to S Fk Two Med. No increase in fishing pressure on S Fk Two Med; **AIR**: Access not shared so lower concentrations of dust and emissions; **ACCESS**: None shared; **GNP-NOISE**: One project adds to background levels plus adds new noise; **WILDLIFE**: Combined seasonal ranges affected = 17,406A. Entire Summit migration corridor affected by one project. All Nw portion of RM-1 available for wildlife displacement; **RECREATION**: 0.0 mi of trail would be overlain by road, 0 mi of NRT overlain by road. Relocate 1 outfitter operation within the RM-1 unit. High disturbance to Summit Campground and snowmobile routes; **VISUAL**: One project seen from viewpoints on NRT; **HEALTH & SAFETY**: Lower risk for vehicle accidents on US Hwy 2.	**O&G EXPLORATION**: $28.4MM combined cost for road construction and drilling; **WATER/FISHERIES**: Sediment yield-C=0.0T, F=0.0T, C/F=0.0T. No risk of sedimentation to S Fk Two Med. No increase in fishing pressure for S FK Two Med; **AIR**: Access shared, higher concentrations of dust and emissions; **ACCESS**: Some shared; **GNP-NOISE**: One project adds to background levels plus new helicopter noise; **WILDLIFE**: Combined seasonal ranges affected = 14,206A. No effect on Summit migration corridor. Total separation in RM-1 unit; **RECREATION**: 0.0 mi of trail would be overlain by road, 0 mi of NRT overlain by road. Relocate 1 outfitter operation within the RM-1 unit. No disturbance to Summit Campground and snowmobile routes; **VISUAL**: No projects seen from viewpoints on NRT; **HEALTH & SAFETY**: No risk for vehicle accidents on US Hwy 2.
MITIGATION: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina respectively will reduce impacts on wildlife seasonal ranges to 5401A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost due to displacement from project activity and from present motorized use on trails. Trail closures will eliminate an additional 32 miles of trail from motorized use. Disallowing projects to take place concurrently will make more trails available for motorized use.	**MITIGATION**: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina respectively will reduce impacts on wildlife seasonal ranges to 6491A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost from displacement from project activity and present motorized use on trails. Trail closures will eliminate an additional 32 miles of trail from motorized use. Disallowing projects to take place concurrently will make more trails available for motorized use.	**MITIGATION**: Use of an 8 1/2 and 5 month window of operation for Chevron and Fina respectively will reduce impacts on wildlife seasonal ranges to 4841A. Road and trail closures will maintain fishing pressure at or below present level and regain habitat lost from displacement from project activity and from present motorized use on trails. Trail closures will eliminate an additional 32 miles of trail from motorized use. Disallowing projects to take place concurrently will make more trails available for motorized use.

4. CUMULATIVE EFFECTS

This section discusses the cumulative effects of past, present and reasonably foreseeable future activities in the study area. Cumulative effects are those effects on the environment which result from the incremental changes of the proposed actions when added to other past, present, and reasonably foreseeable future actions regardless of the agency (federal or non-federal) or person undertaking the action. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

Cumulative effects relating to reasonably foreseeable oil and gas activity in conjunction with the Chevron and Fina projects is discussed in Sections IV.1. and IV.2. Cumulative effects relating to other past, present, and reasonably foreseeable actions is discussed in this Section. The discussion and findings include actions that have been proposed in the past and not resolved, actions that could occur because of land management direction, and actions that could occur with the Blackfeet Tribe exercising reserved rights on their ceded lands.

A. Existing Situation

The unique setting of the RM-1 Unit influences, to some degree, the extent of any foreseeable actions that might occur. This setting of the RM-1 Unit is highlighted by the following relationships:

1. To the north of the RM-1 Unit is Glacier National Park.
2. To the northwest is the Flathead National Forest.
3. To the South and Southwest are the Bob Marshall and Great Bear Wildernesses.
4. To the East is the Blackfeet Indian Reservation.
5. The US Highway 2 - Burlington Northern Railway corridor and some private lands along Marias Pass separates the RM-1 Unit from Glacier National Park.
6. Future Forest Service actions could be influenced by actions on private lands within the RM-1 Unit along Summit Creek and False Summit. Should development of some sort occur, the area would be on the fringe of the RM-1 Unit, but could influence, to some extent, the management strategies of the National Forest lands that lie between US Highway 2 and the South Fork Two Medicine River.

These lands are shown in Map 1.1.

Activities associated with Glacier National Park and the Bob Marshall and Great Bear Wildernesses are primarily recreation and recreation-related. Activities in these areas are unlikely to contribute to cumulative effects except perhaps by increased user activity and generating economic benefits locally.

The US Highway 2 - Burlington Northern Railway corridor is too narrow to accommodate much additional activity or development. Although the corridor borders are outside the defined study area, effects of potential future activity on the environment within the corridor have been included because they may influence the character of and activities on these adjacent lands.

The remaining lands that may have activities that could contribute to future actions are the Flathead National Forest, the RM-1 Unit of the Lewis and Clark National Forest, the Blackfeet Indian Reservation, and local private lands. Portions of the Blackfeet Reservation have been included in the analysis because of interrelationships with roads, Blackfeet Tribe reserved rights, and use of the area by the Blackfeet people. Private lands are found adjacent to the Lewis and Clark National Forest along US Highway 2 and have been included in the analysis because of access to the Forest through and/or near these lands.

Any activities associated with the Flathead National Forest would occur on the west side of the Continental Divide and would have only a limited effect upon the RM-1 Unit. The Continental Divide acts as a natural physiographic separation for watersheds, topography and some wildlife. Some activities on the Flathead

Forest could combine with activities on the RM-1 Unit for a greater effect, such as impacts to the wildlife migration corridor.

Table 4.23 provides an overview of actions that were considered by the ID Team in analyzing cumulative effects of the Chevron and Fina proposed projects. It should be noted that many of the effects associated with future actions are not well defined. Should future actions be permitted as described in Table 4.23, they would conform to management standards for the RM-1 Unit, and project specific mitigation would be applied as necessay. In the case of the grizzly bear, for instance, projects would not be permitted if it was determined that such actions would jeopardize the existence of the bear or affect its habitat.

In some instances, actions identified in Table 4.23 are sufficiently well defined that a more detailed cumulative effects discussion is warranted. A discussion of such cumulative effects is included following Table 4.23. This section discusses anticipated effects as they relate to the reasonably foreseeable oil and gas activities defined in the three scenarios used for analysis in Sections IV.1 and IV.2. These actions are described in Appendix L, and are summarized as follows:

> *Dry Hole* - This scenario encompasses actions from permitting the first APD until the prospect is drilled out and abandoned without production, and reclaimed as recommended in Appendix K. Estimated period of activity would be approximately 3 years.
>
> *Single Well Production* - This scenario encompasses actions that begin with permitting the first APD, and extending through the production period. An additional environmental analysis would be required. The action encompasses a period of about 10 years, with the last 6 years associated with production from a single well. Abandonment and reclamation after 10 years would be as recommended in Appendix K.
>
> *Multi-Well Production* - This scenario encompasses actions that begin with permitting the first APD, and extending indefinitely into the future. Actions would include multi-well production from one or more fields associated with the Chevron and Fina prospects. Abandonment and reclamation would probably occur at some time beyond 10 years. Map 4.1 illustrates the various corridors that would be considered for foreseeable pipeline construction to potential treatment and production facilities. The corridors would be wider than that required for road access alone, and have been used for analyzing cumulative effects of gas/oil production. Prior to permitting any pipeline construction, an environmental analysis would be completed.

The "no action" alternatives are not discussed in the following sections. Under all scenarios there would be no exploration drilling, and therefore, no cumulative effects would be generated.

Table 4.23

An Assessment of Past, Present and Foreseeable Actions in the RM-1 Unit

1. Activities Authorized in the Forest Plan

Activity/Event	Apparent Relationship to the Proposed Exploration Projects
Geophysical Seismic Exploration Activity in the RM-1 Unit	Nearly all the RM-1 Unit has had seismic activity, resulting in seismic roads in some areas. However, many of the seismic roads are now incorporated into the trail system, and are therefore no longer used as roads. The level of seismic activity is currently low and will likely remain low until exploratory wells are drilled and analyzed, or until the oil and gas economy improves. Should either the Chevron or Fina wells show proven reserves, interest in the area could result in increased seismic activity. Future seismic activity would be conducted by helicopter-supported crews, without the need for roads. Seismic activity would be controlled through lease stipulations, project specific mitigation requirements incorporated into the seismic permit, and NEPA analysis in conformance with the Forest Plan. Current direction in the Forest Plan does not allow for roads to be constructed for seismic exploration, all activity must be portable. Under these procedures no significant adverse environmental effects are foreseeable.
Exploration and Development of Other Leases in the RM-1 Unit	Two exploration wells were drilled in the area west of Palookaville approximately 20 years ago. No oil and gas was found. Until a decision is made regarding the Chevron and Fina APDs, no exploration drilling or development will be allowed on other federal leases. These leases have been suspended at the request of the lessees. Permitting the Chevron and Fina Projects to proceed with the proposed exploration drilling could have different effects, dependent upon the success or failure to find gas or oil. Probabilities of finding oil and/or gas are found in Appendix L. It is unlikely that exploration activities would occur on other leases until sometime after the proposed exploration drilling was completed and results known. The cumulative effects of such actions, should they occur, are discussed in more detail in item B. below.
Planned Wildlife Improvement Burns in the RM-1 Unit	Although authorized in the Forest Plan, no burns are currently planned in the RM-1 Unit and no environmental effects of prescribed fire are anticipated. Effects on such future activities would be dependent upon the specifics of the project proposed and the mitigation requirements. Any burn proposal would require environmental analysis considering past, present, and planned activities including oil and gas activities under present leases. Permitting exploration drilling would have no effect upon the use of prescribed fire.

Table 4.23 (continued)

Activity/Event	Apparent Relationship to the Proposed Exploration Projects
Commercial Timber Sales in the RM-1 Unit	Although the Forest Plan allows unprogrammed harvest, including insect and disease salvage, no sales are proposed in the RM-1 Unit and none are anticipated in the foreseeable future. It is possible, however, that constructed exploration roads could be used to access unprogrammed sales should need for timber access coincide with the drilling operation(s). Effects of such actions are discussed in item B. below.

2. Activities Associated with the Blackfeet Reserved Rights

Activity/Event	Apparent Relationship to the Proposed Exploration Projects
Exercise Tribe's Grazing Rights	All allotments in the RM-1 Unit are being utilized. Changes in allotment permittees would cause no environmental effects different from the present permittees. There are currently no plans to increase the amount of grazing acres.
Exercise Tribe's Reserved Timber Rights	No commercial size sales are proposed and there are no plans for tribal sales within the RM-1 Unit. The Blackfeet Tribe's current use of their reserved timber for personal and home use is minor, and probably would not change to any great degree unless roads were constructed into the RM-1 Unit. By improving road access, the Blackfeet Tribe may choose to reconsider the use of their reserved timber rights. Cumulative effects of such an action is discussed in item C. below.
Construction of Badger Creek Dam	The Badger Creek Dam project, as outlined, envisions a dam and a 3 to 4 mile long impoundment in Badger Creek, primarily on National Forest land. Feasibility of the project has not been determined. If determined feasible, several years for design and permitting would likely be required prior to construction. Effects analysis and permitting of the dam and impoundment would consider any existing rights in the RM-1 Unit, and would be subject to the NEPA process.

Table 4.23 (continued)

3. Externally Generated Activities

Activity/Event	Apparent Relationship to the Proposed Exploration Projects
Oil and Gas Exploration and Development on Reservation Lands and other non-Forest lands adjacent to the RM-1 Unit	Future exploratory drilling and development could occur, on adjacent private lands and Reservation lands. No proposals are known to exist at this time. Montana Power Company operates a pipeline in a right-of-way located south of US Highway 2. The pipeline crosses the RM-1 Unit in an east-west direction,(See Map 3.2). While this corridor could be expanded and used for additional utility placement, it would not be expanded or used in conjunction with the proposed Chevron or Fina drilling projects. It could be used for future oil and gas development activities should the need occur. This is discussed further in item D. below.
Flathead Timber Sale Activity	There are no sales planned in the coming decade for the Skyland-Puzzle Creek area which is adjacent to the RM-1 Unit. No activities with environmental effects are expected in the foreseeable future.
Occupancy Leases on the Flathead National Forest.	On ruling of the Ninth Circuit Court (Connor et. al. vs. Burford et. al., January 13, 1988) occupancy is prohibited under current leases. Reevaluation of occupancy is needed prior to authorizing exploration drilling and development. No exploration activity can be permitted until such an occupancy analysis is completed that shows location, extent, and type of lease activity that would be allowed. Any activity on leases on the Flathead National Forest in the future would have little effect on the RM-1 Unit, unless access was from the RM-1 Unit, or off the Continental Divide. Any activity close to the Continental Divide or Marias Pass could affect wildlife migration and/or recreation. Cumulative effects relationships are discussed in items D. and E. below.
Highway and Site Reconstruction at Marias Pass	US Highway 2 near Marias Pass is approved for reconstruction along with improvement of the recreation site at Marias Pass. Improvement work on the project is scheduled for FY 1989 and is expected to be completed prior to permitting either the Chevron or Fina projects. Selection of exploration alternatives that access from the US Highway 2 corridor would benefit from an improved, safer, state highway system.
Delisting of Grizzly Bear	Forest Service management policies for the RM-1 Unit would continue to protect the bear whether listed or delisted. No adverse effect on the bear is anticipated.
Subdivision of Private Lands	There are no known subdivision projects on private lands adjacent to the RM-1 Unit. No effects are anticipated.

B. Cumulative Effects in Relationship to Activities Authorized in the Forest Plan

Exploration/Dry Hole

Roaded Access Alternatives

Activities identified by the land management direction in the Lewis and Clark National Forest Plan that pertain to exploration for oil and gas can be broken into two groups: 1) activities that involve seismic work and 2) activities that could occur with respect to leases, such as the evaluation and further exploration of the Chevron and Fina leases including the use of existing road systems and construction and use of new roads. These activities generate effects that may be cumulative when considered by themselves or in combination with other activities listed in this section.

Past seismic exploration has provided substantial information on the geologic structures in RM-1 Unit and adjacent areas. Where seismic roads were constructed and used, this activity has had displacement effects on wildlife and allegedly added to the decline of the goat population. However, past seismic roads have also enhanced recreation access for trail users such as hikers, outfitters, hunters, and ATV and snowmobile users. Additional seismic activity could occur in the future or the information obtained from the dry hole could discourage any further exploration activity. In any case, until the search for oil and gas is either given up or reserves discovered, intermittent oil and gas activities will, in all likelihood, continue. As in the recent past, future seismic activity will be conducted by helicopter supported crews that are subject to conditions imposed by the standards and guidelines in the Forest Plan. Under these conditions of operation, no significant adverse environmental effects are anticipated.

Exploration of the Chevron lease would upgrade existing roads in the Badger Creek drainage and add some new road into the roadless area from North Badger Creek to the well site. Construction of Fina access roads would also aid in exploration by providing access to adjacent leases, including those that would be visible from Glacier National Park. If the "dry hole" finding results, it is unlikely that significant additional exploration activity will continue to occur. It is likely that many of the leases will terminate prior to any drilling taking place, historically a high percent of leases are never drilled upon. Where APDs are received, and drilling authorized, projects will be subject to stringent reclamation requirements as described in Appendix K. Cumulative effects, if any, are likely to be short-term effects.

The most significant cumulative effects are likely to result from actions that involve the lower South Fork of Two Medicine valley and the area encompassing the Fina well site. Activities in this area could add to local emissions, dust and noise levels in the US Highway 2 and Burlington Northern Railroad corridors as well as portions of the Glacier National Park air shed. Visual and noise conflicts could arise between exploration traffic and recreationists using the Continental Divide National Scenic Trail and the Two Medicine-Elk Calf Mountain National Recreation Trail. Portions of these trails may cross or be located within the vicinity of access roads needed for oil and gas exploration. Existing roads and trails and any new roads and trails would be managed in accordance with the Forest Land Management Plan and the Forest Travel Plan.

Oil and gas access roads could also provide access into the RM-1 Unit for other approved purposes, including timber salvage that is authorized in the Forest Plan. Such activities would be short-term activities that could contribute to sediment levels, especially where new roads were constructed. The nature and extent of environmental effects would depend on location and design of the project(s).

Helicopter Access Alternatives

The activities associated with helicopter access alternatives include use of existing roads and construction of drill pads for both the Chevron and Fina projects. None of these actions are expected to generate cumulative effects under the exploration/dry hole scenarios.

Single Well and Multi-Well Production

Roaded Access Alternatives

Activities for single well and multi-well production of the Chevron and Fina leases could generate activity on other leases. Finding oil and gas could encourage other lessees to explore their leases. Interest in the area, including additional seismic activity and exploration drilling, could increase to 1) look for a field, and 2) look for reserves on other leases. The search for oil and gas on adjacent lands, generated by a single well or multi-well production of the Chevron or Fina leases, would require a field development analysis as well as a cumulative effects analysis to address effects on threatened and endangered species. Adverse effects would be mitigated to the extent possible. Some effects may not be fully mitigatable. There may be conflicts with other users in the area. Drilling additional wells and the construction of access roads would disturb more vegetation and could accelerate the spread of noxious weeds. Additional lease activity may also disturb other public access routes for temporary periods. Additional wells in the Fina Project area may also be visible from US Highway 2, in the vicinity of False Summit.

Production from either the Chevron or Fina well(s) could result in a small "sweetening facility", or gas treatment plant within or adjacent to the RM-1 Unit. Sweetening facilities would be larger for multi-well rather than single well production. They could also be designed to process gas from a number of leases. The greater the size of operation that would be served, the greater would be the impact locally. Oil and gas production would also generate the need for pipelines, additional roads, and oil field utilities. A siting analysis and environmental studies would be required prior to permitting any development or production facilities. Such an analysis would consider the collective effects of all those concerns already addressed in Sections IV.1 and IV.2 of this chapter. Some of the identified effects may not be fully mitigated.

Development of a field would increase the demand for housing in East Glacier Park and Browning, and the surrounding communities. Because construction workers may be earning more than those now residing in the area, some local residents could be displaced or find they could not afford higher rents.

Development or activity on other leases could result in more roads and disturbance, resulting in a "chipping away" of the roadless area. Additional restrictions, closures, management, and enforcement would be required for administering roads and trails. Lease activities would increase conflicts with the semi-private (roaded and unroaded) recreation use and enhance roaded ATV, motorcycle and snowmobile use.

Field production would increase the amount of local highway traffic and its related hazards during the period where additional wells are being drilled. Also associated with this increased traffic would be an increase in noise, emissions and dust along the corridor which would negatively affect the air quality in the adjacent areas. With completion of the wells, traffic would decrease considerably. During production, only vehicles for routine maintenance or periodic removal of production fluids would be needed. Any increase in traffic would enhance opportunities for related conflicts and the risk of accidents in the area.

The construction of exploration and development roads in the RM-1 Unit could cause consideration of unprogrammed timber harvest in the RM-1 Unit. Use of any new access roads and any additional roads constructed for removal of timber by the Lewis and Clark National Forest could increase sedimentation downstream from the RM-1 Unit. Commercial timber sales in the RM-1 Unit would add some emissions and dust to those produced from other activities. Burning of any timber generated slash would add particulates to the air, but would be short-term. Commercial timber sales within the RM-1 Unit could cause visual effects, should additional roads be constructed or patches of timber be removed from areas viewed from Glacier National Park and other important viewing areas. If commercial timber sales were permitted, additional displacement of the grizzly bear and other wildlife would occur in the sale areas. An increase in access would result in an increase of mortality risk (both legal and illegal) to all forms of wildlife, and in the long term would require more hunting restrictions to maintain wildlife populations. Commercial timber sales could accelerate the spread of noxious weeds in the area. Commercial timber sales would tend to conflict with recreational use in the area depending on their location and design. Timber sales would benefit the local economy. All proposed commercial timber sale activity would be analyzed on a case-by-case basis to determine cumulative effects in combination with on-going oil and gas and other activities.

Helicopter Access Alternatives

Since roaded access is required to facilitate production of single well and multi-well fields the cumulative effects would be similar to those listed under Roaded Access.

C. Cumulative Effects in Relationship to Blackfeet Reserved Rights

If motorized access into the RM-1 Unit is authorized to members of the Blackfeet Tribe, the Tribal members may choose to exercise their reserved timber rights as stipulated under Article 1 of the 1896 Agreement. Should the Blackfeet choose to exercise their reserved timber rights, the effects of their activity would include additional road use with the subsequent harvest activity. Cumulative effects would be similar to effects described in item B. above for Forest Service timber harvest.

D. Cumulative Effects in Relationship to Other Externally Generated Activities

Externally generated activities that could potentially have a cumulative effect when considered with activity of the Chevron and Fina leases include oil and gas activity and unprogrammed timber harvest on the Flathead National Forest, and various activities on non-National Forest lands adjacent to the RM-1 Unit. Of particular concern are cumulative effects on the US Highway 2 viewing area, and effects on wildlife that use both the Flathead and the RM-1 Unit habitats. Cumulative effects in relation to Glacier National Park are discussed in item D. below.

There would be a potential for oil and gas development facilities and pipelines from both the RM-1 Unit and portions of the Flathead National Forest to encroach in the US highway 2 corridor. This effect would be in addition to activities that are already occurring in the corridor, which include a major railroad that moves 30 some major trains per day, a US Highway that carries over 1,000 vehicles per day, and isolated private lands with various activities including ranching and tourist businesses. There are also buried gas and other public utilities that transect the corridor. Any exploration impacts generated by the Chevron and Fina project alternatives would be insignificant when viewed in addition to those impacts generated by other activities along US Highway 2.

Major oil and gas development along the viewing corridor may or may not result in significant environmental effects, depending on location and mitigation opportunities available. Prior to permitting any facilities siting studies and environmental studies would be required that would identify and disclose specific effects and mitigation needs.

If commercial timber sales were permitted on the Flathead National Forest near the RM-1 Unit, additional displacement of wildlife would occur in the sale areas. However, proposed commercial timber sale activity would be analyzed on a case-by-case basis to determine cumulative effects in combination with oil and gas and other activities. Appropriate mitigation measures would apply to minimize adverse effects.

E. Cumulative Effects of Oil and Gas Activity in Relation to Glacier National Park

Concern has been expressed in the past about oil and gas leasing adjacent to and "up to" the boundary of Glacier National Park. The terms adjacent to, and "up to" Glacier National Park are used in a very general sense because the boundary between Glacier National Park and National Forest administered lands frequently contains intermingled private land, the Burlington Northern Railroad, US Highway 2, and private homes and businesses (see Insert 1).

Glacier National Park's perimeter is approximately 210 miles in length. Of that, 126 miles is partially contiguous with National Forest Administered lands, 39 miles is the Boundary between the U.S. and Canada and 45 miles is the boundary between the Park and the Blackfeet Indian Reservation (see Insert 1).

Leases were issued on the Flathead and Lewis and Clark National Forests in 1981. Presently, the leases on the Flathead National Forest are suspended and not available for activity until the requirements of the Connor v. Burford Decision are met. The Connor v. Burford decision by the Ninth Circuit Court requires, among other things, that site-specific environmental analyses be conducted prior to authorizing activity on all leases on the Flathead National Forest. Thus for a minimum of approximately 2 years, which will be the time to comply with the decision, there will be no activity on Federal leases within the Flathead National Forest.

In order to establish a specific drilling target or a "play", an oil company must start with a large contiguous area of many thousands of acres or more that is open to mineral exploration. Geologic surface mapping and other exploration methods such as gravity, magnetic and seismic exploration are used to define a specific target area for drilling. Adjacent to Glacier National Park there are only two broad general areas of National Forest administered lands which are large enough to support an exploration "play". One is the RM-1 Unit and adjacent lands in the Morrison-Puzzle Creek area on the Flathead National Forest, and the second is the Northern Whitefish Range and North Fork of the Flathead River area on the Flathead National Forest. Within these areas, several specific drilling targets could be defined (as is the case in the RM-1 Unit).

Effects of exploration drilling within these areas would involve ecological, visual, noise, and air quality effects of the type described in Sections IV.1 and IV.2 for the Chevron and Fina projects. Site-specific environmental analyses and public disclosure would precede any decision to authorize drilling activity on Federal leases. Mitigation measures will be used to the extent applicable.

The approximately 45.4 mile section of the boundary from the Fielding Campground along US Highway 2 to West Glacier contains only a thin strip of nonwilderness land between the Great Bear Wilderness and Glacier National Park that is available for leasing (Insert 1). Presently the leases are suspended; and in addition, it is unlikely that an oil and gas "play" will ever occur within this strip because of the very limited acreage available for surface occupancy and drilling and what appears to be locally unfavorable subsurface geology along this trend.

In addition, from the Fielding Campground to West Glacier thence Northward to the Canadian border are the North Fork and Middle Forks of the Flathead Rivers which are classified under the Wild and Scenic Rivers Act. Under this Act, oil and gas leases are denied within the 1/4 mile boundary of the river; and in addition, a 1/4 mile wide area of no surface occupancy was established to protect and set back activity from the river corridor and subsequently from approximately 110 miles of the the boundary of Glacier National Park.

Presently, the only active National Forest administered leases adjacent to Glacier National Park are located along the southeast boundary of the Park, along a 12.4 mile section from Summit Campground eastward to the National Forest boundary on the Lewis and Clark National Forest (Incert 1). These "adjacent" National Forest lands are separated from Glacier National Park by private lands, year-around residences and businesses, a major natural gas transmission line, the Burlington Northern Railroad and US Highway 2. Foreseeable activities and effects concerning this area are described in item D. above.

A summary of potential future activity, or what can be reasonably foreseeable, is shown in Table 4.24. In the near future (one to two years) leases on the Flathead National Forest are expected to remain suspended. Eventually (some time two or more years down the road) the leasing issue may be resolved.

Table 4.24

Potential Future Oil and Gas Activity

Time Period	National Forest Lands adjacent to Glacier National Park	Private Lands and the Blackfeet Reservation adjacent to Glacier National Park
1-2 years	Leases in the RM-1 Unit are presently suspended pending completion of this analysis. Upon completion, drilling may be authorized within the RM-1 Unit. Leases on the Flathead National Forest are expected to remain suspended, and no activity is expected.	In July of 1989 CENEX began drilling on private land on the North Fork of the Flathead River near Glacier National Park.
2-4 years	Drilling may take place within the RM-1 Unit at one or both of the Chevron and Fina locations. Flathead leases are no longer suspended, seismic exploration requests may be received by the Flathead and Lewis and Clark National Forests.	Seismic and drilling activity likely on adjacent Blackfeet Reservation lands to the east, and depending upon the outcome of the CENEX drilling project, there may be continued activity on private lands along the North Fork of the Flathead River adjacent to Glacier National Park.
3-5 years	In the event drilling takes place within the RM-1 Unit, the results are likely being evaluated, and either additional drilling and/or seismic exploration will be planned or the project will be abandoned. Geophysical exploration and possibly drilling requests may be received for leases on the Flathead National Forest.	Continued activity likely to take place on the Blackfeet Reservation and within the North Fork of the Flathead River Valley adjacent to Glacier National Park.

CHAPTER V. MITIGATION AND MONITORING

This chapter lists mitigation measures that would lessen the effects on resources that would result from the proposed drilling operations and access alternatives. Some or all of these measures may be included on Chevron's and/or Fina's APD if the drilling proposal(s) is approved. The assignment of these responsibilities would be done upon permitting of the project. Oil and gas operations are also governed under federal regulations 43 CFR 3160.

Also included in this chapter are outlines for monitoring plans for resources that require monitoring and for determining the effectiveness of mitigation measures. Monitoring will assist in ensuring compliance and will meet monitoring requirements of the Lewis and Clark Forest Plan.

A. MITIGATION MEASURES

Water Resources and Fisheries

Incorporate best management practices (BMP's) into all plans for the prevention of point and non-point sources of water pollution, as specified in the Lewis and Clark Forest Plan. As appropriate, these BMP's are referenced to the Forest Plan Forest-Wide Management Standards (Ch. 2), by the notation, (FP [number and paragraph number]). BMP's specific to this project include the items outlined below which may be identified for the alternative chosen for this project.

Conservation practices are also included in this list of mitigation measures. These practices were developed by the Forest Service to minimize effects of management activities on soil and water resources and to protect water-related beneficial uses on Forest Service lands. Conservation practices are found in the Soil and Water Conservation Practice Handbook (FSH 2509.22, Forest Service, 1988b) which supplements the Forest Plan. As appropriate, these practices are referenced to the Soil and Water Conservation Practice Handbook by the notation (SWCP number) where more comprehensive explanations of each practice are found. The practices that would be included in an approved APD would be monitored to insure correct application and effectiveness as governed by the Forest Plan and by State Water Quality Standards (Administrative Rules of Montana 16.20.6). The Soil and Water Conservation Practice Handbook and Forest Plan are used by the ID Team to develop site specific conservation practices (FP F-1 1 and 2, and FP F-3 1 and 2).

Plans

1. Following are a list of plans to be developed in the design phase of the project (SWCP 16.04). These design plans will be field surveyed by an Interdisciplinary Forest Service/Bureau of Land Management Team including a soil scientist, hydrologist, and fisheries biologist prior to the finalization of an APD. Following this field survey, additional requirements to protect the soil or water resource on specific sites or specific soil types may be identified by the ID Team and will be added to the appropriate plan (FP F-3 2 and 10, and FP L-4 20).

    a. All developments will be located and designed to provide for minimal soil and water resource impact (SWCP 15.02 and 16.05; FP L-4 3).

    b. An erosion and sediment control plan will be developed prior to any construction (SWCP 15.03; FP L-4 3 and 16), and will incorporate the pertinent mitigation measures listed below, under *construction* and *operation and maintenance*.

    c. A floodplain and wetland protection plan will be provided for all activity locations on floodplains or wetlands, (SWCP 11.04 and 11.05; FP F-3 5). This plan will clearly identify the affected floodplains or wetlands and will list the special protective measures for use in floodplains and wetlands, including those listed below. Risk of surface water contamination will be reduced by avoiding facility design and construction within 300 feet of channels or wetlands.

d. An oil and hazardous substance spill and well blowout contingency plan (SWCP 11.07 and 16.08) shall address measures to be taken to protect soil and water resources (FP F-3 7).

e. An approved sanitary protection plan will be required for any construction or operation camp for protection against water pollution.

Construction

1. Operations will be conducted outside of wetlands, stream riparian areas, and floodplains except for designed, temporary crossings during bridge and culvert installation (SWCP 15.12, 11.04, and 11.05; FP G-2 2 and L-4 3, 4, 5, and 9). Operations will only be conducted seasonally in these areas when soil is dry or frozen and water levels are low.

2. Special stabilization measures will be planned for any stream embankment disturbed by the construction of a water crossing or a roadway fill parallel to a streamcourse (SWCP 11.05 and 15.13; FP L-4 6 and 8).

3. Installations which will remain in place through at least one runoff season, in any floodplains or near any channels will be designed to accommodate 50-year flows (SWCP 15.07 and 11.04:FP L-4 13 and 17.

4. Design and construct stream crossings to allow fish passage and to minimize alteration of natural physical stream characteristics on all perennial streams supporting a seasonal or resident fishery (SWCP 15.13; FP L-4 25 and 26).

    a. Design of all crossings is to be coordinated with the Montana Department of Fish, Wildlife and Parks (FP C-3 1 and 2; FP F-3 3; and FP L-4 7).

    b. Instream work shall not be conducted from April 1 through July 15th to keep sedimentation from negatively affecting egg hatching or emergence of cutthroat trout (SWCP 15.04;FP L-4 28).

5. Lined diversions will be used during culvert installation at live water crossings and riprap will be used at culvert outlets to control sedimentation where culvert installation is necessary (SWCP 15.14, 15.15, and 15.16; FP L-4 14). Culvert installation will be completed and diversions eliminated as quickly as possible, normally within 1-2 days.

6. Require temporary stream stability structures where access roads cross stream channels and along steep (greater than 20 percent) cutbanks and fill slopes (SWCP 15.19; FP L-4 11 and 12) and upon the recommendation of the ID Team. Structures will include instream sediment traps installed manually and maintained regularly.

7. Limit areas of disturbance to a minimum. The size of the disturbed area, as well as the potential for erosion, will be significantly reduced by limiting the disturbed areas to the gentlest slopes and by providing design for slope stabilization and prevention of mass failure, (SWCP 15.02 and 15.05; FP L-4 22, 23, and 24).

8. All servicing and refueling of equipment will be done in designated areas well away from wet areas and surface watercourses (SWCP 15.11 and 11.11 and FP L-4 21). Berms will be used around these sites where necessary to contain spills.

9. Before construction, stockpile topsoil for use as fill and seedbed materials for later stabilization and reclamation of disturbed areas (SWCP 15.10). The stockpile shall be protected from runoff or from other losses due to erosion by covering with organic matter, revegetation, or a tarp (see SWCP 15.03 and 15.06).

10. Install erosion and sediment control measures, including slash filter sediment traps, concurrently with construction activities (SWCP 15.03; FP L-4 18). Slash filter sediment traps will be modified as necessary to provide for other values (such as wildlife passage) but will be used with any construction activity within a minimum of 300 feet of all drainageways and wetlands. Slash filter strips (sediment traps) shall also be constructed below all fill slopes. This practice is particularly effective in controlling sediment during the first two years if installed at the time construction begins.

11. Construction or activity may be closed when activity will cause rutting or churning of the road surface (SWCP 15.04, 15.21, and 15.23).

12. Erosion from excavation and sidecast material and from borrow pit, gravel sources and quarries will be controlled, and the soils, channels, riparian areas and vegetation will be protected (SWCP 15.10 and 15.17).

13. Soil, debris, and all waste materials will not be placed in intermittant stream channels, to reduce potential for washout (SWCP 15.12, 15.13, 15.16, and 15.18; FP L-4 10).

14. In order to control erosion, pioneer or temporary roads for construction equipment access shall be confined to the roadway construction limits and shall prevent undercutting of the designated final cut slope and deposition of material outside the limits (SWCP 15.08). These roads will then be obliterated and reclaimed (SWCP 15.25). Drainage will be provided with temporary culverts or bridges (FP L-4 18).

15. Drainage and erosion control work will be completed concurrent with all construction activity or prior to the wet season (SWCP 15.09 and 15.26; FP L-4 19).

16. All areas cleared of vegetation which are used seasonally and which are not otherwise protected shall be protected from runoff and mulched with wood chips, netting, or the equivalent to prevent erosion, before winter of each year, by October 15 (SWCP 15.09; FP F-3 9 through 13). The road surface will be treated by gravel surfacing to control erosion (SWCP 15.22).

17. Reserve pits will be constructed on the upslope side of a pad and will be excavated in stable, undisturbed ground, rather than diked or in fill, to ensure maximum stability and reduce possibilities of leakage (SWCP 16.07). Pits will be lined with an impermeable plastic or an appropriate sealant to protect ground water. Snow accumulations will be managed to prevent runoff into the pit by ensuring that they drain away from the pit. Reserve pits will not be constructed in drainageways. The pit will be constructed to prevent sloughing and to maintain the integrity of the liner. Dumping trash in the reserve pit will be prohibited.

18. Access ramps to surface water supplies, should they be used, will be designed to prevent stream bank damage and erosion (SWCP 15.19 and 15.20; FP F-3 3).

19. In order to reduce the potential for increased watershed deterioration, any existing primitive roads that are no longer needed in the area will be administratively closed, obliterated, or reclaimed to control erosion (SWCP 11.03 and 11.09). These roads will be identified when plans for proposed construction are completed.

20. Reclaim or obliterate roads abandoned by the relocation of project roads, including seeding and erosion control work to increase vegetation diversity and reduce erosion potential (SWCP 11.03).

Operation and maintenance

1. Erosion hazard will be decreased by returning any disturbed area to a slope which provides the greatest potential for successful stabilization. This applies to any disturbed area which will be subsequently obliterated and rehabilitated, throughout all phases of the operation (SWCP 15.02, 15.03, and 16.06).

2. Compacted ground surfaces will be mechanically ripped to loosen the compacted zone prior to stabilization, obliteration, or seeding (SWCP 15.03 and 16.06; FP F-3 11).

3. All disturbed areas resulting from construction shall be provided with any necessary drainage or erosion control structures to prevent erosion, then seeded, fertilized, and mulched as necessary immediately following construction in order to have full vegetation accomplished in the shortest possible time (SWCP 15.06 and 15.26; FP F-3 8, 12, and 13; FP L-4 15 and 19) using mitigation items listed under Vegetation Mitigation.

4. Roads will be maintained to insure erosion and sediment control (SWCP 15.21).

5. Any snow removal will be done in a manner which will protect all resources, including water quality (SWCP 15.24). Snow berms shall not be left that will allow channelization or concentration of melt water on the road or erosive surfaces.

6. Prevent, control, and monitor noxious weeds per items 3 and 4 under Vegetation mitigation and (SWCP 13.07 through 13.13).

7. Reserve pit restoration methods, such as recontouring techniques, and specific erosion control measures, that provide positive protection to both ground and surface water, will be utilized. All liquids will be vacuumed out, hauled to approved disposal sites, and all solids buried (SWCP 16.06 and 16.07).

Downhole

1. Wellbore will be lined with appropriate casing materials for the prevention of groundwater pollution. Only non-toxic drilliing fluids will be used. These measures will all be used with Onshore Order No. 2 (Dept. of Interior, 1984, BLM, 40 CFR 3160) and under SWCP 16.02.

Air Quality, Health and Safety

1. Watering of roads or other dust abatement measures will be used to minimize dust problems.

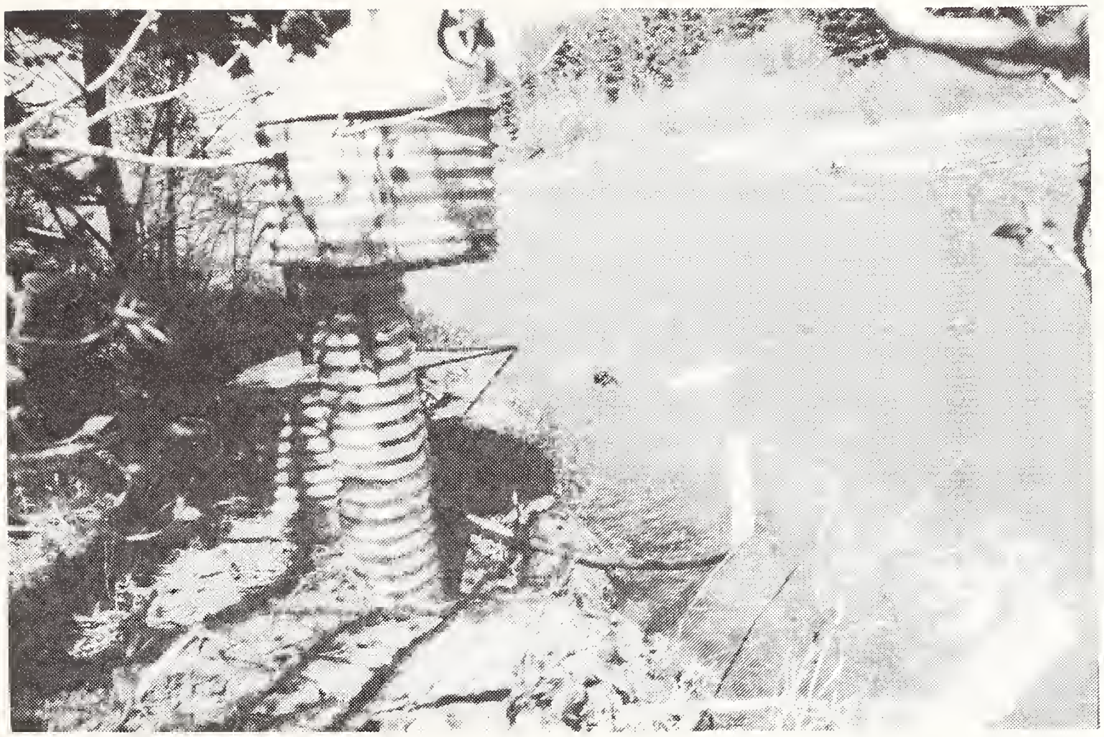
2. Signing at the wellsite during times when drilling may encounter hydrogen sulfide and advance notification to proper personnel can serve to reduce likelihood of persons being exposed to potentially dangerous situations.

3. To reduce pollutants from machinery and vehicles, the companies will maintain and use all applicable pollution control devices on internal combustion engines.

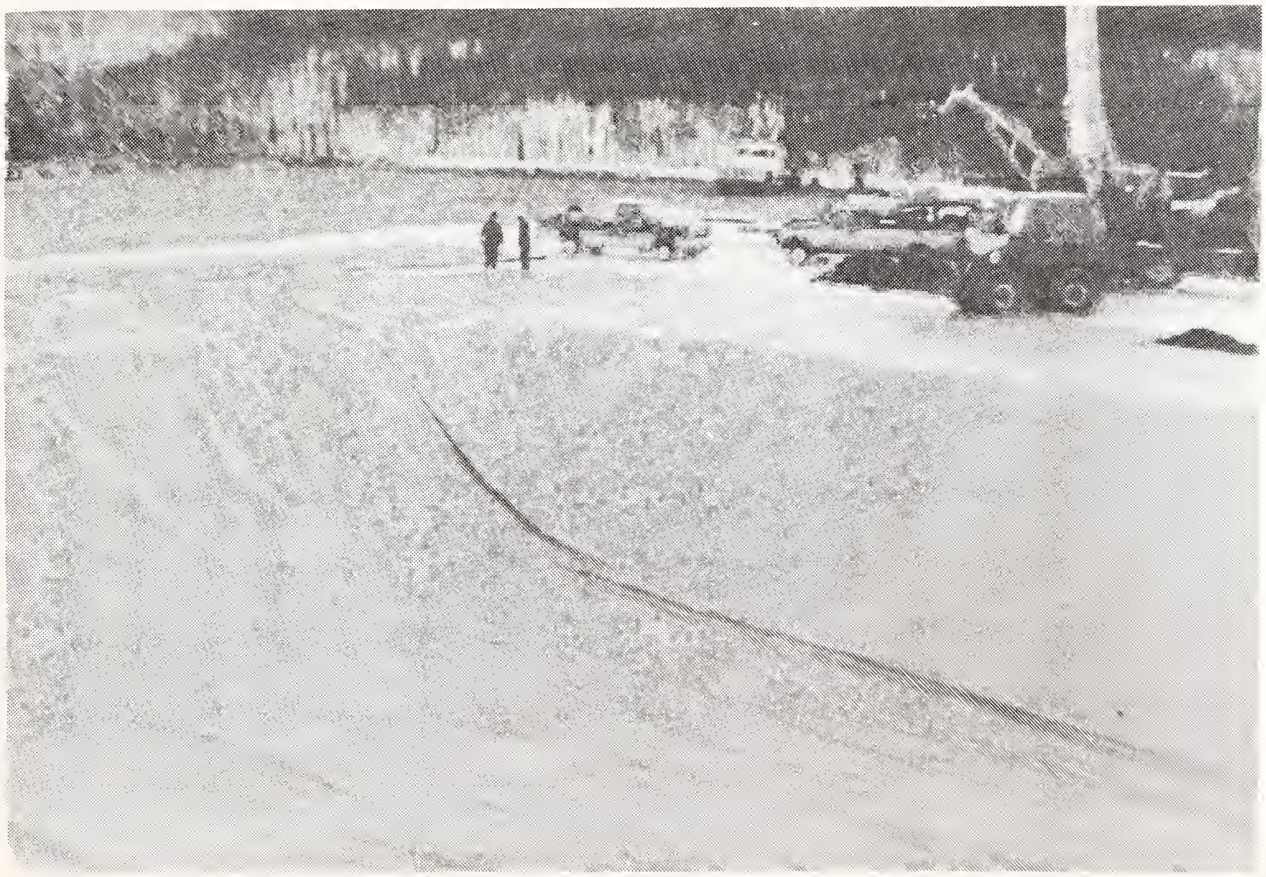
Access Management and Reclamation

1. Road use by the general public will be regulated according to the Lewis and Clark National Forest Plan. This means that:

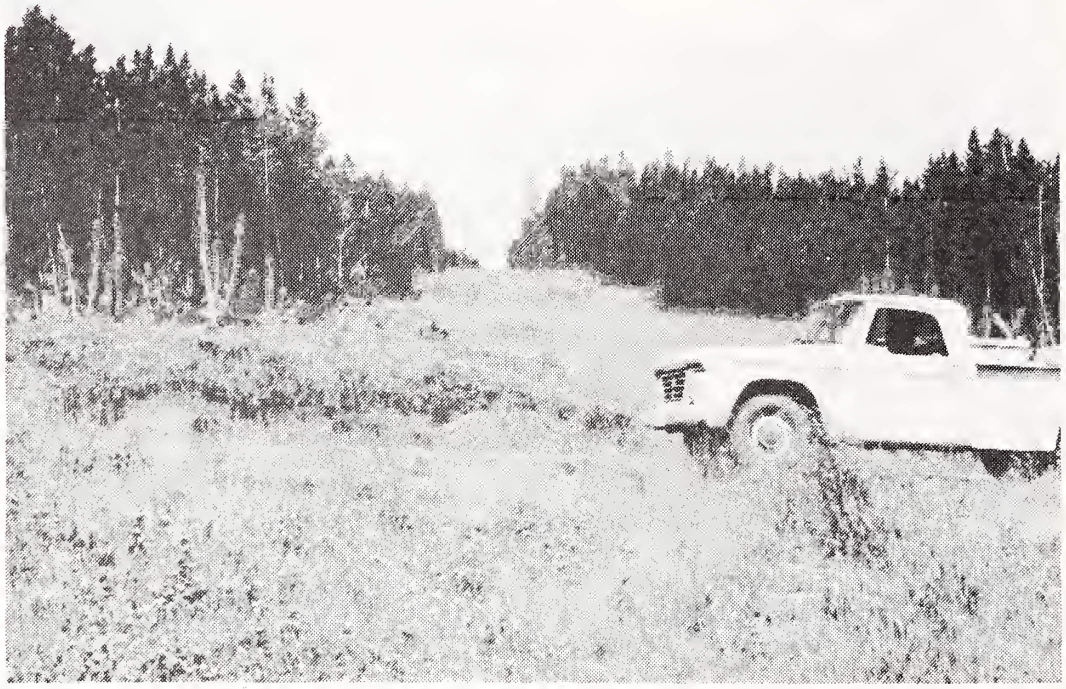
    - Roads now available for public use under the Lewis and Clark National Forest Travel Plan will continue to be available during the window of operations (allowing for some inconvenience



Water Monitoring Station. South Fork of Two Medicine River



Typical line reserve pit required on drilling operations



View upslope of an existing gas pipeline owned by Montana Power Company. Disturbed right-of-way is reclaimed with non-forest vegetation.

View of reclaimed wellsite and road along the Rocky Mountain Front (Celcius Fed. 1-21) west of Choteau. Chevron and Fina well sites would be reclaimed to similar standards during the reconstruction period). Road #9218 between Palookaville and Whiterock Pass will be open July 1 to December 1 (Alt. 2); Pike Creek road will be open year-round (Alts. 1A, 6A, 7A, C2).

- All roads currently unavailable for motorized use year-round, and all newly-constructed roads will continue to be unavailable to the general public for motorized use on a year-long basis.
- All existing and newly constructed roads in the RM-1 Unit will be available for use under a special use permit at the discretion of the Forest Service.

2. During the window of operations road guards will be provided to ensure that road use restrictions are followed.

3. The segment of Trail-102 between Whiterock Pass and Badger Cabin will not be available for use by snowmobiles, motorcycles, and other all-terrain vehicles during the window of operations (Chevron Alternative 2 only). At all other times, the trail will be managed according to the Lewis and Clark National Forest Travel Plan.

4. Interim reclamation will be required at the discretion of the agencies to control erosion and runoff after each season of operation.

5. Final Reclamation of the drill pad and access roads will be in accordance with recommendations in Appendix K. All reclamation work will be prescribed in a reclamation plan provided by the operator and approved by the Forest Service prior to bond determination. Reclamation work will be accomplished no later than the end of the second operating window following completion of the drilling operation.

6. All completed reclamation work will be approved by the Forest Service prior to release of the performance bond. Approval will be no sooner than October 1 of the second year following completion of final revegetation work.

7. Seed species used in the final reclamation will be included in Reclamation Plan.

Wildlife

1. Road and pad layout will be reviewed by a wildlife biologist to ensure impacts to wildlife habitat are minimized, and that coordination measures are followed as close as possible. This applies to the selected alternatives for the construction phase of the project.

2. To minimize the effects to wildlife while on seasonal ranges, the following windows of operation will apply to all alternatives and through all phases of operation:

   Chevron Project--will operate on an 8.5 month window beginning July 15 and ending March 31.

   Fina Project--will operate on a 5 month window beginning July 1 and ending November 30.

3. Establish helicopter flight patterns of not more than one-half (1/2) mile in width between staging areas and drill site operations, unless flying conditions dictate deviations due to safety factors. This applies to all alternatives, especially the helicopter access, through all phases of the project.

4. Because helicopters produce a more pronounced behavioral reaction by big game and raptors than do fixed-wing aircraft, helicopters will maintain a minimum altitude of 600 feet (183 meters) above ground level when flying between staging areas and work areas. This applies to all alternatives through all phases of the operation.

5. Insert "dog-legs" or visual barriers on roads and pipelines built through dense vegetative cover areas to prevent straight corridors exceeding one-fourth (1/4) mile. This applies to all alternatives through all phases of the project.

6. Bus crews to and from drill sites to reduce activity levels on roads. Shift changes should be scheduled to avoid morning and evening wildlife feeding periods. This is normally one half hour after sunrise and one half hour before sunset. This applies to all alternatives through all phases of the project.

7. Prohibit dogs and firearms during work periods or in vehicles traveling to and from work locations. This applies to all alternatives for all phases of the project, and is in keeping with existing company policy.

8. Incinerate garbage daily or store in bear proof containers and remove to local landfill dumps daily. This applies to all alternatives and all phases of the project.

9. Require that study of the effects of project implementation be conducted, with the cost of this being supported by industry, Forest Service and MDFWP (See Monitoring-this chapter, for goals of the monitoring project). The study would key to effects on grizzly bear, elk and mountain goat. This applies to all alternatives through all phases of the project.

10. In order to mitigate the impacts on the Rocky Mountain Goat, it is recommended that additional animals be transplanted from outside sources into the habitat that exists in the Goat Mountain-Running Owl area. This should only be imposed on the company if through the monitoring of the goat population that the proposed activity had an effect on the population. This applies to all alternatives.

11. As discussed in the Biological Evaluation (Appendix F), it is recommended that a crew camp not be allowed at the well site for either the Fina or Chevron wells. If Chevron chooses to have a camp at the well site, the available time period is December 1 to March 31. A possible site outside of grizzly bear habitat for a camp for the Chevron operation (Alt. 2) could be at the junction of the BIA 141 and BIA 2 roads. This area is located outside of any key vegetation components for grizzly bear and lies at the edge of the bear management unit.

12. In order to maintain habitat effectiveness for wildlife, it is recommended that the following trails have motorized use restricted (this does not include snowmobiles) during the window of operation for Chevron:
    Trail 103 from Badger Cabin to the Continental Divide - 7 miles,
    Trail 141 Lee Creek - 4 miles, and trail 142 Kipp Creek - 3 miles,
    Trail 144 should be open to foot and horseback travel only, from the junction with trail 103 to the North Badger Creek and closed to *all travel* from where it crosses North Badger Creek to its junction with the South Badger Creek - 5.5 miles.

    This applies to all alternatives throughout all phases of operation. For the period April 1-July 14, these trails will be managed according to the Lewis and Clark National Forest Travel Plan.

13. In order to maintain habitat effectiveness for wildlife, it is recommended that the following trails have motorized use restricted during the window of operation for Fina:
    Trail 140 in its entirity - 3.5 miles,
    Trail 139 from its junction with trail 172 to junction of trail 118 - 2.5 miles,
    Trail 118 from the private property at Rising Wolf Ranch to the junction with trail 139 - 3.5 miles,
    Trail 181 in its entirity - 3 miles.

    This applies to all alternatives throughout all phases of operation. For the period December 1- June 30, these trails will be managed according to the Lewis and Clark National Forest Travel Plan.

Fisheries

Refer to mitigation for Water Resources and Fisheries, and Access Management and Reclamation

Vegetation

1. Revegetate disturbed sites with native vegetation or seed mixtures appropriate for the area. Long term emphasis should be on reestablishing vegetation which is known to be important for food or cover for grizzly bears or other wildlife, and on reestablishing those vegetative species which are adaptable to the site conditions and compatible with existing vegetation.

2. The well site will be excluded from domestic livestock grazing by fencing off the area until vegetative establishment is complete.

3. Implement Forest Service practices as identified in the Noxious Weed Management EIS for the Lewis and Clark National Forest for the prevention, control and monitoring of noxious weeds. These include the following:

    - Develop an information and education program for the workers designed to emphasize practices that prevent resource degradation and spread of noxious weeds.

    - Maintain vegetative cover, preferably a closed plant community adapted to the site, to limit the encroachment of noxious weeds. Require prompt revegetation where mineral soil is exposed by activities, such as road construction. Apply seed for revegetation based on species adaptation to the specific site conditions, ease of establishment and seed availability.

    - Apply seed of competing species, adapted to the site, to areas treated for noxious weed control, where noxious weed treatment leaves soil and vegetation conditions vulnerable to reinvasion and reoccupancy by noxious weeds.

4. Prior to initiating surface disturbance institute the following measures to prevent the introduction of noxious weed seeds or plant materials:

    - insure that gravel and fill material will come from sources that are free of noxious weeds.

    - insure that construction equipment is clean and free of noxious weed seeds before entering the work site.

5. Prior to surface disturbing activities, an on-the-ground inventory for rare plants will be conducted. If rare plants are identified, management requirements on a site-by-site basis will be developed to allow for the continued existence of the plant.

Outdoor Recreation

1. Motorized equipment will be equipped with approved muffling equipment to limit the noise level to a maximum of 65 decibels when measured 100 feet from the source to minimize impacts of noise on recreation users in the area.

2. Relocate all trails damaged or lost by road construction to minimize disruptions of existing users and use patterns. Reference Table 4.2 and 4.13.

3. Assure that trailhead facilities are designed into roads to allow access to public trails for Chevron *alternative 2* and Fina *alternative A2*.

4. At the request of affected outfitters, relocate their operations to a mutually accepted location to accommodate existing service days.

Visual Resources

Visual landscape management or managing the scenery is based on the premise of areas being seen from the previously mentioned critical viewpoints. The following mitigation measures apply to those critical viewpoints and views from the Two Medicine-Elk Calf Mountain National Recreation Trail and Continental Divide National Scenic Trail:

1. Rocks left as a result of construction activities shall be randomly spaced in irregular shaped piles of varying size to create as natural an appearance as possible.

2. Areas of surface disturbance will be located, when practical, to minimize the visual impact on the landscape. All areas of disturbance and improvements will be designed and constructed to blend with the surrounding areas. Vegetation used for stabilization and reclamation will be chosen so that a harmonious appearance with the surrounding area may be achieved.

3. To meet Forest Plan mitigation requirements and to reduce visual impacts of oil and gas activities to recreation users, a landscape architect will review project location plans and prescribe mitigation needs.

4. Dispose of all debris immediately following road and site construction, either by burning, hauling or use as filter windrows.

5. In road right of way clearings, minimize clearing width and feather vegetation edges to minimize a straight edged, artificial look.

Cultural Resources

Some Blackfeet traditionalists may choose to mitigate impacts by going into the mountains and making individual atonements. Therefore, to facilitate this, we would publish the project work schedule in the "Glacier Reporter" and the "Great Falls Tribune." People would be able to choose an individual or group course of action in accordance, and with privacy.

Archaeological Resources

1. Effects to cultural resources would be mitigated according to the regulations outlined in Section 106 of the National Historic Preservation Act and 36 CFR 800.

2. If a site which is located within the area of impact is determined eligible for the National Register of Historic Places, mitigation measures could include the following: 1) data recovery, 2) avoidance of the sites and/or project relocation, 3) protection of intact materials, such as with a gravel pad.

3. Should impacts to an eligible site be unavoidable, and it is agreed that it is in the public interest to proceed with the proposed project, a Memorandum of Agreement shall be executed with the State Historic Preservation Office and Advisory Council on Historic Preservation specifying any recording, salvage, or other measures associated with acceptance of adverse effects that shall be taken before the project proceeds.

B. MONITORING NEEDS

This portion of Chapter V outlines monitoring plans for ensuring that required mitigation measures are being applied and to track their effectiveness.

Water Resources and Fisheries

Monitoring items as required under the Forest Plan that apply to this project are as follows:

Item F-2. Revegetation of Disturbed Areas

Projects completed under the Forest Plan with temporarily disturbed areas and roads are required to be revegetated within 5 years. An ID Team review 2 years after closing and reseeding or planting any such areas or roads will determine the effectiveness of revegetation required by the project.

Item F-3. Effects on Municipal Watersheds

The project area contains no present municipal watersheds, but the upper Summit Creek was once a water supply and as such has a water quality classification (A-Closed) that requires monitoring, both as an ID Team review of all projects as applied in the field and as individual samples of water for sediment impacts if any project construction takes place in this area. Sampling will be done both before and after construction, and upstream and downstream of construction, where feasible, in this watershed.

Item F-4. Activities in Riparian Areas

Riparian areas include flood plains and wetlands, and activities conducted in them pose an added risk to water-related resources and water quality. Riparian areas will be avoided in project design where possible, though they must occasionally be crossed. An ID Team will review the application of at least half of any project construction in riparian areas.

Item F-5. Effects of all Activities on Watershed Conditions

At least 20% of the remaining area not in municipal watersheds nor in riparian areas will also be reviewed by an ID Team for effectiveness of soil and water conservation practices.

Item F-7. Water and Stream Quality: Validation of Sediment Estimates

Monitoring and evaluation is guided by SWCP 11.02. Sediment is the primary pollutant in need of monitoring. Methodology and intensity of evaluation of sediment are still in a state of development. Considering this, sampling of the South Fork Two Medicine River has continued over the last two years and will continue. This will be expanded with a full monitoring plan with additional sampling when the project is fully designed. Monitoring in North Badger Creek will be initiated prior to beginning project activity in that watershed. The monitoring will include sampling above and below areas of activity during construction to detect any change in sedimentation. Monitoring of drilling operations and casing will be used to assure that there will be no transfer of fluids between aquifers that might result in groundwater contamination.

Item F-8. Condition of Riparian Areas and Streams

Monitoring will include the following:

a. Disturbance in riparian areas will be monitored to limit total impact.

b. Evaluate sediment control mitigation measures used during installation of stream crossing structures

c. Determine adequacy of fish passages at all crossings where passage was specified as important.

d. Collect and analyze core samples from spawning sites on the South Fork of the Two Medicine River and/or North Badger Creek downstream from the proposed construction sites. At least 10 samples from each stream should be collected and compared to conditions as they were in 1986.

The cost of this monitoring is associated with the amount of time needed to collect samples and do the evaluations. The subjective evaluations (items 1 and 2) will take an estimated four days while collection and analysis of core samples will take an estimated eight days.

A detailed monitoring plan will be prepared in coordination with project design for approval prior to initiation of activity.

Wildlife

The following monitoring items are required in accordance with the Lewis and Clark National Forest Plan:

Item C-1. Grizzly Bear-Maintain occupied habitat capacity.

Annually monitor for any indication of a downward trend in grizzly bear population.

Item C-2. Gray Wolf, Bald Eagle, Peregrine Falcon-Maintain suitable unoccupied habitat.

Annually monitor for any deterioration or continuing disturbance on more than 5% of suitable unoccupied habitat.

Item C-13. Oil & Gas Activity/Wildlife Monitoring.

Annually monitor for any indication of a downward population trend in species in management guidelines related to gas and oil activity.

In the Forest-wide management standards, there is a requirement to utilize the Rocky Mountain Front Guidelines in designing and carrying out management activities on the Rocky Mountain Division. The introduction to the Guidelines addresses monitoring and evaluation of the guidelines. Because the guidelines were only partially based on information acquired during the Rocky Mountain Front studies there is a real need to complete further monitoring to increase our knowledge of affects of management activities on selected wildlife species and to determine if the guidelines are too restrictive or not restrictive enough.

Another process that requires monitoring is the zone-of-influence of an activity and the disturbance coefficient assigned to that activity in relationship to the cumulative effects model for grizzly bears.

In order to gather the necessary information for evaluating the guidelines and the cumulative effects model coefficients, animals will have to be trapped and radio collared. This is presently the only method which provides animal specific information. The three main species that will need monitoring are the grizzly bear, mountain goat, and elk.

Because the animals have to be trapped and handled, their monitoring would normally be the responsibility of Montana Department of Fish, Wildlife and Parks. The Forest Service and the State have the responsibility to prepare a monitoring plan that would delineate the objectives of the study as well as the manpower and cost needed to complete the study. These plans would be completed within a short time after a decision is made on a preferred alternative. The plans would be reviewed by the companies involved. It would be the responsibility of the Forest Service, Montana Department of Fish, Wildlife and Parks, Chevron and Fina to contribute dollars to fund these monitoring studies.

It is essential that trapping and collaring animals would take place prior to any ground disturbing work by either Chevron or Fina. Therefore it is important that the monitoring plans state the objectives and start up time frames for each species. Communications must take place between agencies so that monitoring studies can begin prior to the windows of operation for the companies. The projects will not be delayed in the event that animals or personnel are not in place to carry out the monitoring.

The following are the goals of the monitoring plans:

Grizzly Bear

Goal 1 - Evaluate the effects of the proposed projects on grizzly bear distribution and habitat use within the Badger-Two Medicine BMU.

Goal 2 - Evaluate the disturbance and zone-of-influence coefficients that have been developed for the CEM.

Rocky Mountain Goat

Goal 1 - Evaluate the effects of the proposed projects on goat use of mapped habitat.

Goal 2 - Determine if there is any effect on the goat population during the life of the project and for a period of 2-3 years after the project has ceased.

Elk

Goal 1 - Evaluate the effects of the proposed project on elk use of the Badger-Two Medicine BMU with emphasis on road and drill pad effects.

It would be anticipated that the monitoring for these projects would begin prior to any activity by the company and would carry through until the project is complete. If the well is a dry hole, completion would be through reclamation. It is anticipated that the monitoring studies would run for 4-6 years and the cost would range from $300,000 - $350,000. If it is not a dry hole and there is some type of production development, a decision would have to be made about monitoring that would continue through development and for what period of time.

Vegetation

Monitor travelways and staging areas for noxious weed invasion. Place a high priority on treating noxious weeds on these sites to prevent the spread to other areas of the Forest. Take special care to inspect construction sites, borrow pits and rock quarries for noxious weed establishment.

CHAPTER VI. LIST OF PREPARERS

USDA-FOREST SERVICE

Name	Education	EIS Responsibility
Paul Barrett*	B.S Forest Management M.S. Forest Economics	Computerized Data Information Coordinator
Palmer Bowen	B.S. General Psychology	Social Assessment
Stuart Buchanan*	B.S. Wildlife Management	Vegetation, Noxious Weeds, Livestock Grazing
Karen Cramer	Art and Design, University of Montana	Graphic Design
Lynne Dickman*	B.A. Geology M.S. Economic Geology	Technical Editing, Organization, and Format
Charles R. Frey*	B.A. Geology	Technical Support, FS Liaison
Donald Godtel*	B.S. Wildlife Biology	Wildlife Resources
Cynthia Hamlett*	B.A. Anthropology M.A. Anthroplogy	Religion, Culture, Archaeology, and Social Effects
Valdon Hancock*	A.S. Forestry B.S. Watershed Mgt. M.S. Range and Watershed Mgt.	Water Resources
Herb Holdorf	B.S. Agronomy	Technical Support on Soils and Hydrology
Tim Love*	B.A. Forestry and Geography	Recreation, Blackfeet Tribal Rights, and Roadless Area Evaluation
Doug McClelland	B.S. Mechanical Engineering M.S. Civil Engineering (Geotechnical Option)	Geotechnical Review and Analysis
Elizabeth McFarland	B.S. Geology	Technical Editing
Kerri McMenus	B.A. Sociology M.S. Natural Resource Economics	Technical Support for Social Effects

USDA-FOREST SERVICE (continued)

Name	Education	EIS Responsibility
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Wayne Phillips	B.S. Forestry M.S. Resource Economics	Plant Species of Special Concern, Noxious Weeds
Dale Schaeffer*	B.S. Construction Engineering	Access and Reclamation, Engineering Design and Cost
Jane Schmoyer-Weber*	B.S. Forestry B.S. Art Education	Public Involvement and Social Effects
Dick Smith	B.S. Wildlife Technology	Forest Plan Coordination
Robin Strathy*	B.A. Geology B.S. Geological Engineering	Geology, Air Quality, Health and Safety
Pat Thomas*	B.A. Landscape Architecture	Visual Resources
Beth Ihle*	B.S. Geology M.S. Earth Sciences	Technical support, editing
Len Walsh*	B.S. Fisheries Management B.S. Fisheries Science	Fisheries, Pesticides and Herbicides
Norman Yogerst*	B.S. Forestry M.S. Forest Management	EIS Team Leader, Agency Coordination, Soils, Glacier Park and Adjacent Wilderness

USDI-BUREAU OF LAND MANAGEMENT

Name	Education	EIS Responsibility
Paul Kruger	B.S. Atmospheric Sciences	Technical Support on Air Quality and Noise
Chuck Laakso*	B.S. Geological Engineering	Petroleum Engineering, Planning and Production
Jerry Majerus*	B.S. Forestry M.S. Forestry	Socioeconomics

USDI-BUREAU OF LAND MANAGEMENT (continued)

Name	Education	EIS Responsibility
Gary Slagel*	B.S. Wildlife Management	BLM Resources

USDI-BUREAU OF INDIAN AFFAIRS

Name	Education	EIS Responsibility
David J. Broberg*	B.S. Forestry	Blackfeet Reservation Resources
Jim Claar*	B.S. Wildlife Biology	Wildlife

USDI-NATIONAL PARK SERVICE

Name	Education	EIS Responsibility
Steve Gniadek*	B.S. Wildlife Management and Forestry Resources M.S. Wildlife Biology	Glacier National Park
Dalles Koehn*	B.S. Forestry	Glacier National Park Resources
Gerald "Buzz" Cobell*	B.S. Wildlife Biology M.S. Fisheries and Wildlife	Glacier National Park Resources

STATE OF MONTANA-DEPARTMENT OF FISH, WILDLIFE AND PARKS

Name	Education	EIS Responsibility
Bill Hill*	B.S. Fish and Wildlife Mgt. M.S. Wildlife Biology	Fisheries and Water Quality
Gary Olson*	B.S. Wildlife Biology M.S. Range Management	Wildlife

BLACKFEET TRIBE

Name	Education	EIS Responsibility
Gordo Horn*	Blackfeet Business Tribal Council	Blackfeet Tribe Representative (1988 and 1989)
Carl Kipp*	Blackfeet Business Tribal Council	Blackfeet Tribe Representative (1986)
Vicky Santana	Juris Doctorate	Blackfeet Legal Representative
Lee Wilson*	Blackfeet Business Tribal Council	Blackfeet Tribe Representative (1986 and 1987)

OTHER

Name	Organization	Contribution
Jon Lazzaretti	Columbia Helicopters Inc.	Helicopter Mobilization and Feasibility
Oscar Oliviera	Chevron U.S.A., Inc.	Project Coordinator
Kenneth Pitt	USDA Office of General Counsel	Legal Aspects of Blackfeet Treaty Rights
Jody Miller	USDA Office of General Counsel	Legal Consultation

*Interdisciplinary Team Member

CHAPTER VII. PUBLIC INVOLVEMENT AND CONSULTATION WITH OTHERS

This chapter outlines the public involvement process and the consultation with other agencies that occurred in preparation of this draft EIS. The first public involvement efforts were conducted in December 1983-January 1984 for the Fina EA analysis. Details of the process used can be found in the Hall Creek EA (BLM and FS, 1985, pages 129-139). The first Chevron EIS public involvement effort was conducted in March and April, 1986, and was specifically conducted for the Chevron APD. A subsequent scoping effort was conducted in February and March of 1988 to solicit comments on the combined Chevron/Fina EIS.

A. PUBLIC PARTICIPATION AND COMMENTS ON CHEVRON APD
MARCH-APRIL 1986

Public participation actions for the Chevron project occurred in two phases: 1) an initial scoping phase in order to identify issues and concerns, and 2) identification of issues by the interdisciplinary team.

Scoping Phase

The Forest Service contacted over 700 individuals during the scoping period. The objectives of scoping were: 1) to inform people of Chevron's proposal and the interagency interdisciplinary process that would be used to evaluate the company's proposal; and 2) to encourage potentially affected interests to review the company's proposal and assist the interdisciplinary team in identification of issues, concerns and opportunities.

The following is a summary of the public participation activities conducted during the scoping period:

-- On March 5, 1986, a scoping package was mailed to 624 individuals. The package contained: a letter explaining the Forest Service's role in the processing of the permit application, information about the company's proposal, a map with the proposed well site location, and a schedule of the scoping meetings to be held.

The mailing list for the Chevron EIS was developed from a combination of existing mailing lists including: 1) people active during the Hall Creek/American Petrofina environmental analysis; 2) people active in the Blackleaf Field Development EIS; and 3) others who had received information on oil and gas activity on the Rocky Mountain Front and requested to be informed of future activity.

-- On March 10, 1986, the Notice of Intent appeared in the Federal Register. The scoping comment deadline was set for April 16, 1986. The schedule for three scoping openhouse/workshops was listed in the Federal Register as follows:

1. Choteau, Mt., Rocky Mountain Ranger District Office - April 3, 1987.

2. Great Falls, Mt., Lewis and Clark National Forest Office - April 9, 1987.

3. Browning, Mt., Little Flower Catholic Church Center - April 10, 1987.

-- Considerable interest in the proposal was displayed on the University of Montana campus in Missoula. Congressman Pat Williams requested an additional openhouse/workshop be scheduled in Missoula to acknowledge the interests of a newly formed environmental group called the 'Badger Chapter of the East Glacier-Two Medicine Alliance'. An additional openhouse/workshop was scheduled for April 22, 1986. To inform residents in the Missoula area of this additional session, 73 letters were sent to interested individuals living in the Missoula, Bitterroot, and Kalispell areas on March 28, 1986. The letter informed them of the time and location of the additional Missoula session. Also on that date, a news release was sent to 22 newspapers and 11 radio/television stations throughout the area including the Great Falls Tribune, Kalispell Daily Interlake, Hungry Horse News, and Missoulian.

In the release, the locations and dates of the four scoping sessions were advertised. Because the Missoula scoping session (April 22, 1986) was scheduled after the original scoping comment deadline (April 16, 1986), the comment deadline was extended to April 28, 1986.

-- Attendance at the scoping openhouse/workshops was 13 in Choteau, 25 in Great Falls, 89 in Browning, and 46 in Missoula. Openhouses were held during the day on these four dates, and issue workshops were held during the evenings. The openhouses were information sessions, whereas the issues workshops were interaction-oriented sessions. During the issues workshop, participants were asked to express their concerns about the proposal. Each concern was individually recorded and used in the comment content analysis.

-- On April 10, 1986, Norm Yogerst, EIS Team Leader, was interviewed by Great Falls television station KRTV (Susan Chisolm) and on April 22, 1986 by Missoula stations KPAX (Connie Timpson and Kevin Maki) and KECI (Steve Harris) and news correspondent for the Great Falls Tribune, Jim Bruggers. The television interviews were aired the same day the interviews were taped, and the Tribune article appeared on April 23, 1986.

-- On April 28, 1986, the comment period for the scoping period ended. The comment period lasted a total of 49 days after its appearance on the Federal Register.

In addition to the comments received at the scoping sessions, the Lewis and Clark Forest received 137 letters during the comment period. There were 120 letters received from individuals who did not appear to represent any interest group; 6 letters were from business interests; 9 letters were from environmental/conservation-type groups; and 2 letters were from government agencies.

Issue Identification Phase

The content analysis of the scoping comments was completed by Jane Schmoyer-Weber, Lewis and Clark National Forest Public Information Specialist, and Betty Schmitt, Gallatin National Forest Public Information Specialist. Each comment received from the public was examined by the core ID team and issue statements were generated. The issue statements identified the resources involved and the concerns of the ID team and the public. These issues (as listed in Chapter I.) set the stage for much of the analysis. They also help generate the evaluation criteria to be established later in the NEPA process. If the study team did not develop an issue statement from a specific comment, the reasoning was presented as a 'Response' in the content analysis. The completed content analysis can be found in appendix D.1. It contains the scoping comments; the interdisciplinary team's responses to those comments; and the issue statements developed from the comments. A complete record of the written comments is on file in the Forest Supervisor's office.

Those on the mailing list were periodically informed of the EIS progress:

-- On August 1, 1986, the content analysis package was mailed to everyone who participated in the scoping process. The package included a list of the issues derived from the public comments and responsive statements on comments that were not considered issues.

-- On October 17, 1986, an update letter was sent to everyone on the mailing list. A list of the alternatives to be considered in the analysis was included in the letter.

-- On June 5, 1987, another update letter was sent to those on the mailing list. The alternatives being analyzed were again identified and the reason for the delay in completing the draft EIS was explained.

Numerous news articles regarding the Chevron proposal and EIS have been published in local, regional, and national newspapers and tabloids. Articles were often generated by environmental groups opposed to oil and gas development in the Badger-Two Medicine area. Others were progress reports on the status of the EIS that oil and gas industry representatives initiated. Copies of news articles that were provided to the EIS team are filed at the Lewis and Clark National Forest headquarters in Great Falls.

B. PUBLIC PARTICIPATION AND COMMENTS ON THE COMBINED CHEVRON/FINA ANALYSIS FEBRUARY-MARCH 1988

On February 23, 1988, the Notice of Intent to Amend the EIS appeared in the Federal Register; interested individuals were requested to comment by the scoping period deadline of March 25, 1988. Because extensive scoping had previously been done for the Fina analysis (1983-84) and the Chevron analysis (1986) the FS and BLM decided that public scoping meetings were not needed. This decision was upheld by the public, since no requests for public meetings were received during the comment period.

On February 24, 1988, a scoping package was mailed to approximately 350 people notifying them of the decision to combine the Chevron and Fina analyses into one comprehensive Environmental Impact Statement and requesting their assistance in refining or identifying the issues to be examined in the combined environmental analysis.

The scoping letters contained:

1. A history of the two projects (Chevron and Fina)

2. The reasons for undertaking a comprehensive EIS disclosing the effects of exploratory drilling and production facilities for both proposals.

3. Copies of the content analyses from the a) 1984 Scoping document for the Fina Analysis; b) 1986 Scoping Document for the Chevron Analysis; and c) 1987 Summary of the Issues raised in the appeals of the Fina Decision Notice.

4. A request to review the comment/issues packages and submit any additional issues that the interdisciplinary team may have overlooked in the previous scoping periods.

On February 24, 1988, news releases were submitted to 21 newspapers around the state and the three local television stations in Great Falls. On March 3, 1988, an article appeared in the Great Falls Tribune. Other articles appeared in several of the local newspapers around the same time.

On March 22, 1988, another news article appeared in the Great Falls Tribune with a reminder of the comment period deadline of March 25, 1988.

The Forest received seven written letters and one telephone comment during this scoping period. Of the letters received, three were from environmental/conservation-type groups; one was from a recreation organization, and three were from government agencies. The telephone comment was from a government agency.

The concerns raised in this scoping effort are summarized in Appendix D.3. Correspondence, copies of news articles, and other information received regarding this effort are filed at the Lewis and Clark National Forest headquarters in Great Falls.

On April 26, 1988 an updated list and description of the alternatives for the combined Chevron/Fina analysis was sent to approximately 350 individuals and organizations. The letter included a colored map displaying the alternative locations.

C. CONSULTATION WITH OTHER AGENCIES

The Chevron, and subsequently, the amended Chevron/Fina environmental analyses were conducted as interagency projects with representatives from several agencies serving on the interdisciplinary team: Bureau of Land Management (BLM), Bureau of Indian Affairs (BIA), Blackfeet Tribal Business Council, Glacier National Park (NPS), and the Montana Department of Fish, Wildlife and Parks (MDFWP). The U.S. Fish and Wildlife Service was kept informed of the progress of the team. Although a core team of individuals from the Forest Service and the Bureau of Land Management prepared most of the analysis information, the complete interdisciplinary team was sent information for review and comment throughout the process. Complete ID team meetings were held to review the core team's progress at several critical stages in the analysis.

Meeting dates were as follows:

- June 11, 1986: An ID Team Meeting was held in Augusta to review the issue statements developed from the content analysis and to discuss potential project alternatives. Issue assignments were also made to the appropriate team members. The meeting was attended by 12 people.

- September 9, 1986: An ID Team Meeting was held in Choteau to review the status of the issue analysis and to discuss preliminary alternatives. A representative of Columbia Helicopters, Inc. was available to discuss helicopter mobilization. 24 people attended this meeting.

- February 4, 1987: An ID team Meeting was held in Choteau to review drafts of Chapters I, II, and III of the EIS. This meeting was attended by 20 people.

- August 20, 1987: An ID Team Meeting was held in Great Falls to review drafts of Chapter IV of the EIS. 15 people attended this meeting.

- On March 31, 1988, an ID team meeting was held in Great Falls to update everyone on the revised EIS Schedule and to discuss new issues and alternatives regarding the Fina analysis. Sixteen people attended this meeting.

The following groups were involved with the analysis process:

National Park Service - Glacier National Park officials provided the study team with resource and use information for Glacier National Park as requested. An official of the Park Service was on the interdisciplinary team.

Bureau of Indian Affairs - Officials of the BIA provided the study team with resource information for the Blackfeet Reservation as requested. An official of the BIA was on the interdisciplinary team.

Chevron - Chevron USA, as the proponent, provided project information to the interdisciplinary team as requested. The company also provided grizzly bear habitat information for the study area, through its contractor, ECON. Inc. Chevron also provided archaeological survey information through its contractor, Senco-Phenix.

Blackfeet Tribe - The Tribal Business Council identified a representative to be a member of the interdisciplinary team. Numerous other contacts were made with tribe members to discuss Blackfeet religion and culture, social concerns, and legal aspects relating to Blackfeet Reserved and Agreement Rights. A scoping meeting was held in Browning to facilitate participation in the early stages of the Chevron analysis.

Officials from the Forest Service worked closely with the Blackfeet traditionalists since January 1986 in order to learn of and consider the concerns of the Blackfeet traditionalists. The Forest archaeologist and other members of the EIS interdisciplinary team continued this consultation with the Tribe on the religious and cultural concerns. Regularly scheduled meetings were held in Browning with the Forest archaeologist, Blackfeet traditionalists and with members of the Pikuni Traditionalist Association. All contacts concerning Blackfeet religion and culture included the involvement of Buster Yellow Kidney and Curly Bear Wagner, who were officially designated by the Blackfeet Tribal Council, as traditional cultural authorities for the Blackfeet. In addition, Buster Yellow Kidney was contracted by Chevron U.S.A. to accompany the Senco-Phenix archaeologists in their investigation of the cultural and religious values and sites.

Several meetings were held with the Blackfeet traditionalists during the preparation of the EIS. Members were given draft sections of the EIS to review and comment. Verbal discussions with tribal members also provided information with which to prepare the traditional culture and religion sections of the EIS. Members of the traditionalists were apprised of the Chevron and Fina alternatives on several occasions, and comments were solicited. Traditionalists were also consulted prior to the agencies' selecting a preferred alternative for the proposed projects. Information was requested at that time to help the agencies in selection of alternatives that would prevent or minimize effects on traditional religious practices.

This project was also discussed with a representative of the Kootenai Indian Tribe, of the Confederated Salish and Kootenai Reservation near Flathead Lake. He recognized that participation in the EIS process would be quite time consuming and that his people would rely on the Blackfeet to express Native American religious concerns. No other American Indian tribes have expressed concerns for the RM-1 area.

Montana Department of Fish, Wildlife, and Parks - Biologists from the Department have worked closely with Forest Service biologists to identify concerns and exchange information on the wildlife species in the area. Most of the information concerning the grizzly bear on the Rocky Mountain Front came from a study completed by the Department's research biologist. Department Biologists were very involved in the development of the Cumulative Effects Model (CEM) for evaluation of the effects to the grizzly bear. As members of the CEM team, they helped develop the conceptual basis for the computer model. Department biologists also reviewed the vegetative mapping used in the cumulative effects analysis (prepared by ECON, Inc.).

U.S. Fish and Wildlife Service - Informal consultation with members of the FWS has been ongoing throughout the EIS process. A representative has been on the ground with the Forest Service biologists to conduct a reconnaissance of the proposed access routes. This agency also reviewed the vegetative mapping prepared by ECON, Inc. As members of the CEM team, they have had the same involvement in the development of the computer model as have the MDFWP, BLM and Forest Service. Formal consultation with the agency is planned to meet requirements of the Endangered Species Act. The biological evaluation will be sent to them for their review and opinion.

Information on the consultation efforts undertaken during the Hall Creek analysis can be reviewed in the 1985 Hall Creek EA, specifically pages 140-142.

CHAPTER VIII. LIST OF AGENCIES, ORGANIZATIONS AND PERSONS TO WHOM COPIES OF THE ENVIRONMENTAL IMPACT STATEMENT ARE SENT

The following agencies, organizations and individuals will receive copies of the draft environmental impact statement.

MONTANA CONGRESSIONAL DELEGATION

Senator Max Baucus
Senator Conrad Burns

Representative Ron Marlenee
Representative Pat Williams

FEDERAL GOVERNMENT

Advisory Council on Historic Preservation
Washington, DC

Environmental Protection Agency
Denver, Col.
Washington, DC
Helena, Mt.

USDA - Forest Service
Missoula, Mt.
Kalispell, Mt.

USDA - Office of Equal Opportunity
Washington, DC

USDA - Soil Conservation Service
Washington, DC
Helena, Mt.

USDI - Bureau of Indian Affairs
Billings, Mt.
Browning, Mt.
Box Elder, Mt.

USDI - Bureau of Land Management
Great Falls, Mt.
Lewistown, Mt.

USDI - Environmental Project Review
Washington, DC

USDI - National Park Service
West Glacier, Mt.

USDI - US Fish and Wildlife Service
Helena, Mt.

STATE GOVERNMENT

Air Quality Bureau
Helena, Mt.

Department of Fish, Wildlife, and Parks
Helena, Mt.
Great Falls, Mt.
Choteau, Mt.
Fort Benton, Mt.
Conrad, Mt.

Department of State Lands
Kalispell, Mt.

Environmental Quality Council
Helena, Mt.

Governor's Office
Helena, Mt.

Oil and Gas Conservation Division

State Historic Preservation Office

State Lands Commission

University of Montana
Environmental Library
Border Grizzly Project

Water Quality Bureau
Helena, Mt.

CITY AND COUNTY GOVERNMENTS

Blackfeet Community College
Browning, Mt.

Cascade County Commissioners

Glacier County Assessor

Glacier County Commissioners

Marias River Basin Weed Control
Shelby, Mt.

Pondera County Commissioners

TRIBAL GOVERNMENT

Blackfeet Legal Department
Browning, Mt.

Blackfeet Tribal Business Council
Browning, Mt.

Blackfeet Tribe, Planning Department
Browning, Mt

Lewis and Clark Project

OTHER ORGANIZATIONS AND INDIVIDUALS

Amerada Hess
Houston, Tx

American Wilderness Alliance
Englewood, Col.

Amoco Production Co.
Denver, Col.

Anadarko Production Co.
Denver, Col.

Arco Oil and Gas Company
Midland, Tx.
Dallas, Tx.

Audubon Society
Great Falls, Mt.

BHP Petroleum
Englewood, Col.

Bill Bishop

Arne Bolle

Chevron USA
Denver, Col.
Englewood, Col.

Earl Old Person, Chief of Blackfeet
Browning, Mt.

Coalition for Canyon Preservation
Hungry Horse, Mt.

Committee for Glacier/Bob Marshall Ecosystem
Parkersburg, W.V.

Cut Bank Chamber of Commerce
Cut Bank, Mt.

Mark Daniels
Shelby, Mt.

Davis, Graham and Stubbs

Defenders of Wildlife
Missoula, Mt.

Edward and Berta DesRosier

East Slope Backcountry Horsemen
Brady, Mt.

Econ, Inc.
Helena, Mt.

Energy Resources Conservation Board
Calgary, Alberta

George Engler

EPS Resources
Great Falls, Mt

Ethnoscience
Billings, Mt.

Carl B. Field

Fina Oil and Chemical Co.
Oklahoma City, Okla.

John Frederick, Jr.

Daniel J. Funsch

Delwyn Gage

Geological Research and Engineering Co.
Great Falls, Mt.

Glacier Two Medicine Alliance-Badger Chapter
Missoula, Mt.

Glacier Two Medicine Alliance
East Glacier Park, Mt.

Great Bear Foundation
Missoula, Mt.

Great Falls Chamber of Commerce
Great Falls, Mt.

Great Falls Gas

Great Falls Tribune

Headwaters Journal
West Glacier, Mt.

Richard Jackson

J.J. Jonkel

Kalispell Daily Interlake

KCTB Radio
Cut Bank, Mt.

Ann Kohlman
Billings, Mt.

Louisiana-Hunt Petroleum
Dallas, Tx.

Ed Madej

Don Marble

Ursula Mattson

Carley McCaulay

Joe McKay

Montana Oil and Gas Association
Cut Bank, Mt.

Montana Oil Journal
Billings, Mt.

Montana Petroleum Association
Helena, Mt.

Montana State Legal Foundation
Denver, Col.

Montana Wilderness Association
Helena, Mt.
Great Falls, Mt.
Kalispell, Mt.

Montana Wildlands Coalition
Malta, Mt.

National Audubon Society
Boulder, Col.

National Parks and Conservation Association
Washington, DC
Salt Lake City, Utah

Nature Conservancy
Choteau, Mt.

National Wildlife Federation
Missoula, Mt.

Ira Perkins

Pikuni Traditionalists Association
Heart Butte, Mt.

Placid Oil
Dallas, Tx.

Mark Ratlidge

Dexter M. Roberts

Rocky Mountain Oil and Gas Association
    Denver, Col.

Rosewood Resources
    Dallas, Tx.

George Roskie

Sacred Land Foundation
    Mill Valley, Cal.

Leslie A. Selyem-Shaw

Gene Sentz

Sierra Club
    Helena, Mt.
    Missoula, Mt.

Swan View Coalition

Bernie A. Swift

Teton County Land Owners Association

Jack Tuholske

W. M. Vaughey Jr.

Wildlands Resource Association
    Great Falls, Mt.
    Fort Shaw, Mt.

Wilderness Society
    Bozeman, Mt.

Wildlife Federation
    Missoula, Mt.

George Wuerthner

John Yellow Kidney

Bob Yetter

Zane and Gloria Zell

CHAPTER IX. BIBLIOGRAPHY

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CHAPTER X. GLOSSARY OF TECHNICAL TERMS

ABANDONED WELL	A well no longer in use, whether because it was drilled as a dry hole, or has ceased to produce or for some other reason can not be operated. Statutes and regulations in many states require the plugging of abandoned wells to prevent the seepage of oil, gas, or water from one stratum to another.
ACCESS	See Public Access
AFFECTED ENVIRONMENT	The biological and physical environment that will or may be changed by actions proposed and the relationship of people to the environment.
AGGREGATE SOURCE	A location for securing crushed, screened, or pit-run rock for use as a road surfacing material.
AIRFA	American Indian Religious Freedom Act
ALLOTMENT	See Range Allotment.
ALTERNATIVE	A proposal offering a choice between two or more courses of action, of which only one may be chosen.
ALTERNATIVE, NO ACTION	A proposal or course of action that maintains established trends or management direction.
ANIMAL UNIT	A measure of habitat carrying capacity. The amount of range required to sustain an individual animal for one year.
ANIMAL UNIT MONTH (AUM)	The quantity of forage required by the equivalent of a 1000 pound mature cow for one month.
ANSI	American National Standards Institute
APD	Application for Permit to Drill
API	American Petroleum Institute
AQUIFER	A geologic formation or structure that transmits water in sufficient quantity to supply the needs for a water development, such as a well.
AUM	Animal Unit Month.
BEST MANAGEMENT PRACTICES (BMP)	The set of practices, when applied during implementation of a project, ensures that water related beneficial uses are protected and that the State water quality standards are met.
BIA	Bureau of Indian Affairs
BIG GAME	Those species of large mammals normally managed as a sport hunting resource.

BLM	Bureau of Land Management
BLOWOUT	An uncontrolled flow of gas, oil, and other fluids from a well to the atmosphere. The uncontrolled flow occurs when the formation of pressure exceeds the pressure being applied by the column of drilling fluid.
BOTTOM HOLE	The lowest or deepest part of a drilled well.
BMU	Bear Management Unit
CEDED LANDS (Ceded Strip)	Those lands on the Rocky Mountain Front where the Blackfeet Indian Nation retained certain rights under the Agreement of 1896.
CEQ	See Council of Environmental Quality.
CFR	Code of Federal Regulations.
CONCERN	See Management Concern.
CONSTRAINT	A limit which restricts alternatives.
CONTINENTAL DIVIDE	The drainage divide between waters flowing to the Atlantic Ocean and the Pacific Ocean.
COUNCIL ON ENVIRONMENTAL QUALITY (CEQ)	An advisory council to the President established by the National Environmental Policy Act of 1969. It reviews Federal programs for their effect on the environment, conducts environmental studies, and advises the President on environmental matters.
CRITICAL WILDLIFE HABITAT	That portion of wildlife habitat that is essential to the survival and perpetuation of threatened and endangered species as designated by the U.S. Fish and Wildlife Service.
CULTURAL RESOURCES	The physical remains (artifacts, ruins, burial mounds, petroglyphs) and conceptual content or context (as a setting for legendary, historic, or prehistoric events, as a sacred area of native peoples) of an area of prehistoric or historic occupation.
CUTTINGS	Fragments of rock dislodged by the drill bit, during oil and gas drilling, and brought to the surface in the drilling mud.
DERRICK	Any one of a large number of types of load-bearing structures. In drilling work, the standard structure has four legs standing at the corners of the substructure and reaching to the crown block. The substructure is an assembly of heavy beams used to elevate the main structure above ground, and provide space to install blowout preventers, casing heads, etc.

DIRECTIONAL DRILLING	Occasions arise when it is necessary or advantageous to drill at an angle from the vertical. Controlled drilling at an angle makes it possible to reach subsurface points laterally remote from the point where the bit enters the earth.
DISPERSED RECREATION	That portion of outdoor recreation use which occurs outside of developed sites in the unroaded and roaded forest environment i.e., fishing, hunting, backpacking, and berry picking.
DRILLING	The operation of boring a hole in the earth, usually for the purpose of finding and removing subsurface formation fluids such as oil and gas.
DRILLING CREW	A driller, derrickman, and two or more helpers to operate a rotary drilling rig for one tour each day.
DRILLING FLUID	The circulating liquid used to bring cuttings out of the wellbore.
DRILLING RIG	The derrick, draw-works, and attendant surface equipment of a drilling or workover unit.
EA	See Environmental Assessment.
EFFECTS	Physical, biological, social, and economic results (expected or experienced) resulting from proceeding with, implementing, or approving implementation of the project proposal.
EIS	See Environmental Impact Statement.
ENDANGERED SPECIES	Any species of plant or animal, that is in danger of extinction throughout all or a significant portion of its' range. Endangered species are identified by the Secretary of the Interior in accordance with the 1973 Endangered Species Act.
ENVIRONMENTAL ANALYSIS	A process involving analysis of alternative actions and their predictable short-term and long-term environmental effects, which include physical, biological, economic, social, and environmental design factors and their interactions.
ENVIRONMENTAL ASSESSMENT (EA)	A concise public document for which a Federal agency is responsible that serves to: (1) Briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact. (2) Aid an agency's compliance with the Act when no environmental impact statement is necessary. (3) Facilitate preparation of a statement when one is necessary.
ENVIRONMENTAL IMPACT STATEMENT (EIS)	A detailed written statement as required by Sec.102(2)(C) of the National Environmental Policy Act.

EVC 1-Untouched	Areas of +/- 5000 acres in which only ecological changes have taken place, except for low impact rails and fences.
EVC 2-Unnoticed	Changes in the landscape are not visually evident to the average person unless pointed out. This also includes low visual impact 2-track trails and roads that may or may not be visible on most aerial photos.
EVC 3-Minor Disturbance	Changes in the landscape are noticed by the average person, but they don't attract attention. The natural appearance of the landscape still remains dominant. This includes developed pastures and roads and fields not associated with farmsteads.
EVC 4-Disturbed	Changes in the landscape are easily noticed by the average person and may attract attention. This includes cropland or highly developed hay fields (structural irrigation and canals). Well-designed oil fields are almost always included, as their size and influence over the landscape is not entirely mitigatable. The natural appearance of the landscape is definitely impacted in fields with well spacing at 160 acres or less.
EVC 5-Major Disturbance	Changes in the landscape are strong and would be obvious to anyone. These changes stand out as domination impression of the landscape. Oil fields that are not designed or have no mitigating measures, as well as other activities that have major landscape impacts, are included.
EVC 6-Drastic Disturbance	Changes in the landscape are in glaring contrast to the natural appearance. Almost anyone would be displeased with the effect and agree that rehabilitation is required.
EXPLORATORY WELL	A wildcat well. A well drilled in an area where no oil or gas production exists.
FIELD	A geographical area in which a number of oil and gas wells produce from a continuous reservoir. The term generally refers to the surface area, although at times it may refer to both the surface and underground productive formations. In a single field, there may be several separate reservoirs at varying depths.
FILTER WINDROW	Slash, straw bales, or other material placed at the toe of a fill, on a newly constructed road, to catch and hold sediment occurring until the new road fill becomes stabilized and revegetated. The primary purpose of a filter windrow is to reduce the amount of sediment in streams.
FLOOD PLAIN	The lowland and relatively flat area adjoining inland waters, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year.
FS	Forest Service, U.S. Department of Agriculture
FSH	Forest Service Handbook, usually followed by a number referring to a specific handbook

FP	Forest Plan
GIS	Geographical Information System
HABITAT EFFECTIVENESS	A measure of the habitat that is available for the grizzly bear population. It is determined by comparing the existing habitat with the presence of man's activities, against the existing habitat without man's activities.
ID	Interdisciplinary (Associated with Interdisciplinary Team)
ILBA	Interior Board of Land Appeals
IMPACT	The results of an action on the environment. The action may be primary (direct) or secondary (indirect).
ISSUE	See Public Issue.
KICK	An entry of water, oil, gas, or other formation fluid into the wellbore.
MANAGEMENT CONCERN	An issue, problem, or condition that constrains the range of actions identified for consideration in the planning process.
MDFWP	Montana Department of Fish, Wildlife and Parks
MIGRATION CORRIDOR	A travel route used traditionally by wildlife in their seasonal movement from one range to another.
MINERALS, LEASABLE	Types of minerals whose prospecting and development on public lands under permit or lease was authorized by the Mineral Leasing Act of February 25, 1920, as amended and supplemented (41 Stat. 437, 30 USC 181-287). For example, coal, phosphate, sodium, potassium, oil, oil shale, and gas. (FSM 2800).
MITIGATE	To lessen the severity of impacts to a level that may be determined to be acceptable for project approval.
MITIGATION	To abate or reduce an impact to the environment by: (1) Avoiding a certain action or parts of an action. (2) Employing certain construction measures to limit the degree of impact. (3) Restoring an area to preconstruction conditions. (4) Preserving or maintaining an area throughout the life of a project. (5) Replacing or providing substitute resources to the environment.
MODIFICATION	Activities may visually dominate the original characteristic landscape. However, activities of vegetative and land form alteration must borrow from naturally established form, line, color, or texture so completely and at such a scale that its visual characteristics are those of natural occurrences within the surrounding are or character type. Additional parts of these activities, such as structures, roads, slash, and wads, must remain visually subordinate until they are compatible with the natural surroundings.

MUD	Liquid circulated through the wellbore during any drilling operations to bring out cuttings. Also called drilling fluid.
NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)	An act to declare a National policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.
NATIONAL FOREST LANDSCAPE MANAGEMENT SYSTEM	A system of planning and administering the use of forest lands so that the visual effects maintain or upgrade man's psychological welfare. It is the planning and design of the visual aspects of multiple use land management.
NCDE	Northern Continental Divide Ecosystem
NEPA	See National Environmental Policy Act.
NSO	No Surface Occupancy. Refers to a mineral lease stipulation that permits passive activities, such as seismic exploration or directional drilling from adjacent areas, but prohibits the occupancy of the surface with roads or drilling equipment.
OVERTHRUST BELT	A complex geologic feature, extending from Alaska to Mexico, which resulted from compressional stresses within the earth, and which is characterized by abundant thrust faults. This zone passes through and includes all of Western Montana.
PARTIAL RETENTION	Activities remain visually subordinate to the characteristic landscape and may repeat form, line, color, or texture common to the landscape. However, changes in the qualities of size, amount, intensity, direction and pattern remain visually subordinate to the characteristic landscape. Duration of Visual Impact: Reduction in form, line, color, and texture should be accomplished as soon after project completion as possible or at a minimum within the first year.
PERENNIAL STREAMS	Streams that flow continuously during all of the calendar year as a result of groundwater discharge or surface runoff.
POACH	To take fish or game illegally.
PLUG	An object or device that serves to block a hole or passageway. For example: A cement blockage in a borehole.
PRESERVATION	Management activities, except for very low visual-impact recreation facilities, are prohibited. Only ecological changes are allowed.

PRODUCTION	The amount of gas or oil that can be obtained from a well in a given period of time. That phase of the petroleum industry that has to do with bringing the well fluids to the surface and separating them, and with storing, guaging, and otherwise preparing the oil or gas for commercial use.
PROPOSED ACTION	In terms of the National Environmental Policy Act, the project, activity, or action that a Federal agency intends to implement or undertake, and is the subject of an environmental analysis.
PUBLIC ACCESS	Usually refers to a road or trail route over which a public agency claims a right-of-way available for public use.
PUBLIC ISSUE	A subject or question of widespread public interest relating to management of National Forest System lands.
PUMP	A device that increases the pressure on a fluid or raises it to a higher level.
RANGE ALLOTMENT	A designated area of land available for livestock grazing upon which a specified number and kind of livestock may be grazed under a management plan. It is the basic land unit used to facilitate management of the range resource on National Forest System and associated lands administered by the Forest Service.
RARE II	See Roadless Area Review and Evaluation II.
RECORD OF DECISION	A document, separate from, but associated with an environmental impact statement, that publicly and officially discloses the responsible official's decision on the proposed action.
RESERVE PIT	Mud pit in which a supply of drilling fluid is stored for use.
RESERVOIR	A subsurface porous and permeable rock body in which oil and/or gas is stored. Lithologically, reservoir rocks are either limestones, dolomites, or sandstones, or their combination. There are essentially three types of hydrocarbon reservoirs: Oil, gas, and condensate.
RETENTION	Activities must not be visually evident and may only repeat form, lime, color, and texture which are frequently found in the characteristic landscape. Changes in the qualities of size, amount, intensity, direction, and land pattern should not be evident. Duration of Visual Impact: Immediate reduction in form, line, color, and texture contrast. Retention should be accomplished either during operation or immediately after. It may be done by such means as seeding vegetative clearings and cut-or-fill slopes, hand planting of large stock, and painting structures.
RIGGING UP	Before the task of drilling can start, but after the derrick has been built, tools and machinery must be installed to ready the derrick for drilling.

RIPARIAN ZONE	Geographically delineated areas, with distinctive resource values and characteristics, that are comprised of the aquatic and riparian ecosystems, floodplains, and wetlands. For management purposes, they include all areas within a horizontal distance of 100 feet from the edge of perennial streams or other water bodies.
RM-1	Rocky Mountain unit as designated in the Lewis and Clark National Forest Plan. Also referred to in the Forest Plan as the North End Geographic Unit. The unit is also referred to, on occasion, as the Badger-Two Medicine Area, and the Blackfeet Unit.
RMF	Rocky Mountain Front. Refers to the east slope of the Rocky Mountain Range (from the Continental Divide to the Great Plains), from Canada south to the Dearborn River, Rocky Mountain Front Wildlife Monitoring and Evaluation Program.
RMF GUIDELINES	See Interagency and Evaluation Program. See Bibliography.
RN	Roaded Natural appearing setting. A classification of the recreation opportunity spectrum, where the area is characterized by predominately natural appearing environments with moderate evidences of the sights and sounds of man. Interaction between users may be low to moderate, but with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities.
ROADLESS AREA	A National Forest area that (1) is larger than 5000 acres or, if smaller than 5000 acres, contiguous to a designated wilderness or primitive area; (2) contains no roads, and (3) has been inventoried by the Forest Service for possible inclusion in the wilderness preservation system.
ROADLESS AREA REVIEW AND EVALUATION (RARE II)	A comprehensive process, instituted in June 1977, to identify roadless and undeveloped land areas in the National Forest System and to develop alternatives for both wilderness and other resource management.
ROS	Recreation Opportunity Spectrum. A system for planning and managing recreation resources that recognizes recreation activity opportunity, recreation setting opportunity, and recreation experience opportunity along a continuum.
ROTARY DRILLING	The drilling method by which a hole is drilled by a rotating bit to which a downward force is applied. The bit is fastened and rotated by the drilling string, which also provides a passageway for the circulating drilling fluid.

SCOPING PROCESS	An early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to the proposed action. Identifying the significant environmental issues deserving of study and de-emphasizing insignificant issues, narrowing the scope of the environmental impact statement accordingly. (Ref. CEQ regulations, 40 CFR 1501.7).
SEDIMENT	Solid material, both mineral and organic, that is in suspension, being transported, or has been moved from its site of origin by air, water, gravity, or ice.
SEISMIC EXPLORATION	A process used to map underground geological features, to obtain more reliable information on the earth's subsurface, and to locate areas where accumulations of oil and gas might occur.
SIGNIFICANT IMPACT	A meaningful standard to which an action may impact the environment. The impact may be beneficial, adverse, direct, indirect, or cumulative, and may have short-term or long-term effects.
SLASH FILTER WINDROWS	See Filter Windrows
SMALL GAME	Birds and small animals normally hunted or trapped.
SOUR OIL OR SOUR GAS	Oil or gas containing sulfurous compounds such as hydrogen sulfide. they require expensive, corrosion-resistant refining facilities.
SPM	Semi-Primitive Motorized. A classification of recreation opportunity spectrum that characterizes a predominantly natural or natural appearing environment of a moderate to large size. Motorized use is present.
STIPULATIONS	Forest Service or Bureau of Land Management requirements or clauses of a mineral lease.
SWCP	Soil and Water Conservation Practices. The set of practices which, when identified during implementation of a project, ensures that soil productivity is maintained, soil loss and water quality impacts are minimized, and water-related benficial uses are protected. These are identified in Forest Service Handbook 2509.22-Soil and Water Conservation Practices Handbook.
THREATENED SPECIES	Any species of plant or animal which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its' range. Threatened species are identified by the Secretary of the Interior in accordance with the Endangered Species Act.
TIERING	Refers to the elimination of repetitive discussions of the same issue by incorporating by reference the general discussion in an environmental impact statement of broader scope. For example, a project environmental assessment could be tiered to the Forest Plan EIS.

TOTAL DEPTH (TD)	The maximum depth reached by a well.
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
VENT	An opening in a vessel, line, pipe, or pump designed to permit the escape of air or gas.
VISUAL QUALITY OBJECTIVE (VQO)	A desired degree of acceptable alteration of the landscape based on physical and sociological characteristics of an area. (Also See Appendix I.)
VISUAL RESOURCE	The composite of basic terrain, geologic features, water features, vegetative patterns, and land uses that typify a land unit and influence the visual appeal the unit may have for visitors. Usually the seen features of the landscape.
VISUAL SENSITIVITY LEVELS	An index of the relative degree of user interest in scenic quality and concern and attitude for existing or proposed changes in the landscape features of an area in relation to other areas in the planning unit.
VQO	See Visual Quality Objective.
WELLBORE	The hole made by the drilling bit.
WELLHEAD	The equipment used to maintain surface control of a well. It is formed of the casing head, tubing head, and Christmas tree.
WELL PERMIT	The authorization, usually by a governmental conservation agency, to drill a well. Sometimes required for deepening a well, or remedial work.
WILDLIFE HABITAT	All elements of a wild animal's environment necessary for completion of its life cycle. These elements include food, cover, water, and living space.
YOY	Young Of the Year. A term used by fishery biologists when referring to fish born that year, and includes yearling fish.

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